HP Jetdirect Print Servers
Administrator's Guide

635n

HP Jetdirect Print Servers (635n)

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1 Introducing the HP Jetdirect Print Server

HP Jetdirect print servers allow you to connect printers and other devices directly to a network. By attaching a device directly to a network, you can install it in a convenient location and share it with multiple users. In addition, a network connection allows data transfers to or from the device at network speeds.

HP Jetdirect EIO internal print servers are installed in HP printers that have a compatible enhanced input/output (EIO) slot. HP Jetdirect external print servers connect printers to the network by adapting the printer's USB port to the network.

When connected through a wireless connection to your network, an HP Jetdirect wireless print server provides similar printing services as Jetdirect print servers connected by network cables.

NOTE Unless otherwise specified, the term print server in this manual refers to the HP Jetdirect print servers and not a separate computer running print server software.

Supported Print Servers

The features and capabilities of HP Jetdirect print servers depend on the print server's product model and its operating firmware version. This manual describes features and capabilities for the product models listed in the following table.

Table 1-1 Supported Products

Model	Product Number	Printer Connect	Network Connect	Network Protocols and Features	Firmware Version[3]
635n	J7961A/G[1]	EIO slot	10/100/1000–T	Full[2]	V.31.*xx.nn*

1 When available, product numbers with a “G” suffix (or later) comply with HP specifications for the Reduction of Hazardous Substances (RoHS), sometimes referred to as HP's “lead (Pb) free” initiative.

2 Full support includes TCP/IPv4, IPX/SPX, AppleTalk (EtherTalk), LPR/LPD, Security. See Table 1-2 Supported Network Protocols. HP Jetdirect 635n print servers also provides support for TCP/IPv6 (Internet Protocol version 6) and IPsec (Internet Protocol security).

3 *xx* represents a release number. If *nn* appears, it is an encoded value for HP support use only.

The installed firmware version can be identified using various methods, including the HP Jetdirect configuration page (see HP Jetdirect Configuration Pages), Telnet (see TCP/IP Configuration), embedded Web server (see HP Jetdirect Embedded Web Server (V.31.xx)), and network management applications. For firmware updates, see “Firmware Upgrades”.

Supported Network Protocols

The supported network protocols, and popular network printing environments that use those protocols, are listed below.

Table 1-2 Supported Network Protocols

Supported Network Protocols	Network Printing Environments[1]	Product Support
TCP/IPv4	Microsoft Windows 98/Me/2000/XP (32- and 64-bit) and Server 2003, Direct Mode printing Microsoft Terminal Server and Citrix MetaFrame environments[2] Novell NetWare[2] 5, 6.x[2] UNIX and Linux, including: Hewlett-Packard HP-UX, Sun Microsystems Solaris (SPARCsystems only), IBM AIX[2], HP MPE-iX[2], RedHat Linux[2], SuSE Linux[2] LPR/LPD (Line Printer Daemon, RFC 1179–compliant) systems[2] IPP (Internet Printing Protocol) FTP (File Transfer Protocol)	J7961A/G (635n)
TCP/IPv6	Microsoft Windows XP (32- and 64-bit) and Server 2003, Direct Mode port 9100 printing. (Requires HP IPv6/IPv4 port monitor software running on the system.) LPR/LPD (Line Printer Daemon, RFC 1179–compliant) systems with IPv6 client support.	J7961A/G (635n)
IPX/SPX and compatible	Novell NetWare[2] Microsoft Windows 98/Me/NT4.0/2000/XP (32-bit only), Direct Mode printing	J7961A/G (635n)
AppleTalk (EtherTalk only)	Apple Mac OS	J7961A/G (635n)
DLC/LLC	Microsoft Windows NT[2]	J7961A/G (635n)

1 Refer to the current HP Jetdirect product data sheets for additional network systems and versions. For operation with other network environments, consult your system vendor or authorized HP dealer.

2 For these network systems, contact your network system vendor for software, documentation, and support.

If not supplied with this product, HP network setup and management software for supported systems may be obtained from HP support at:

http://www.hp.com/support/net_printing

For software to set up network printing on other systems, contact your system vendor.

Security Protocols

SNMP (IPv4 and IPX)

SNMP (Simple Network Management Protocol) is used by network management applications for device management. HP Jetdirect print servers support SNMP and standard MIB-II (Management Information Base) objects on both IP and IPX networks.

Full-featured HP Jetdirect print servers (such as 635n) support an SNMP v1/v2c agent, and an SNMP v3 agent for enhanced security.

NOTE On IPv4/IPv6 networks, HP Jetdirect 635n supports SNMP/IPv4 agents only. However, IPv6 and IPsec objects may be viewed using SNMP/IPv4 commands.

HTTPS

Full-featured HP Jetdirect print servers (such as 635n) support HTTPS (Secure Hyper Text Transfer Protocol) for secure, encrypted management communications between the embedded Web server and your Web browser.

Authentication

EAP/802.1X Server-Based Authentication

As a network client, HP Jetdirect full-featured print servers (such as 635n) support network access using the Extensible Authentication Protocol (EAP) on an IEEE 802.1X network. The IEEE 802.1X standard provides a port-based authentication protocol where a network port can allow or block access depending on client authentication results.

When using an 802.1X connection, the print server supports Extensible Authentication Protocol (EAP) with an authentication server, such as a RADIUS (Remote Authentication Dial In User Service, RFC 2138) server.

HP Jetdirect 635n print servers support the following EAP/802.1X methods:

- **PEAP** (Protected Extensible Authentication Protocol). PEAP is a mutual authentication protocol that uses digital certificates for network server authentication and passwords for client authentication. For additional security, the authentication exchanges are encapsulated within TLS (Transport Layer Security). Dynamic encryption keys are used for secure communications.
- **EAP-TLS** (EAP using Transport Layer Security, RFC 2716). EAP-TLS is a mutual authentication protocol based on X.509–compliant digital certificates for authentication of both the client and the network authentication server. Dynamic encryption keys are used for secure communications.

The network infrastructure device that connects the print server to the network (such as a Procurve switch by HP) must also support the EAP/802.1X method used. In conjunction with the authentication server, the infrastructure device can control the degree of network access and services available to the print server client.

To configure the print server for EAP/802.1X authentication, you must access the embedded Web server through your Web browser. For more information, see HP Jetdirect Embedded Web Server (V.31.xx).

IPsec

HP Jetdirect 635n print servers support IPsec (Internet Protocol security) over IPv4 and IPv6 network traffic. IPsec is a network layer security protocol that provides authenticity, data integrity, and privacy of IP traffic. On IPv6 networks, the print server's IPsec implementation provides the opportunity for true end-to-end security capabilities with other IPsec systems.

To help you configure the print server for IPsec operation, a browser-based wizard is provided that is accessed through the embedded Web server. For more information, see IPsec Configuration.

Supplied Manuals

The manuals listed below are supplied with your print server or with printers that have factory-installed print servers.

- *Start* or *Use* guides, or equivalent printer documentation (shipped with printers that have factory-installed HP Jetdirect print servers).
- This manual, the *HP Jetdirect Print Server Administrator's Guide* for the applicable Jetdirect product models.
- HP Jetdirect *Setup* guides, supplied on CD-ROM with off-the-shelf print servers).

HP Support

HP Online Support

Click your way to a quick solution! The HP Web site:

http://www.hp.com/support/net_printing

is a great place to start for answers to questions about your HP Jetdirect print server—24 hours a day, 7 days a week.

Firmware Upgrades

Full-featured HP Jetdirect print servers support firmware upgrades to allow installation of new or enhanced features. Firmware upgrade files may be downloaded and installed on the print server over your network. If available for your print server model, firmware upgrade files may be obtained from Hewlett-Packard at:

http://www.hp.com/go/webjetadmin_firmware

Firmware Installation Tools

Firmware upgrades for supported HP Jetdirect print servers may be installed over a network using one of the following firmware installation tools:

- HP Jetdirect Download Manager (Windows). HP Jetdirect Download Manager can be downloaded from HP online support at:

  http://www.hp.com/go/dlm_sw

- HP Web Jetadmin may be used on supported systems. For more information on HP Web Jetadmin, visit:

  http://www.hp.com/go/webjetadmin/

- The embedded Web server resident on the print server provides a firmware upgrade feature using your Web browser. For more information see HP Jetdirect Embedded Web Server (V.31.xx).

- FTP (File Transfer Protocol) may be used to transfer a firmware upgrade image file to the print server. To start an FTP session, use the device IP address or host name. If a password is set, it must be entered to log into the device. After user login, typical FTP commands to upgrade the device are illustrated below:

  ```
  ftp> bin
  ftp> hash
  ftp> cd /download
  ftp> put <firmware image filename>
  ftp>##################
  ##################...
  ftp> bye
  ```

  where `<firmware image file>` specifies the full path name. Be sure that the download is complete before exiting the session.

HP Support By Phone

Highly trained technicians are ready to take your call. For the most recent HP support telephone numbers and available services worldwide, visit:

http://www.hp.com/support/support_assistance

NOTE For toll-free support in the USA and Canada, call 1-800-HPINVENT or 1-800-474-6836.

NOTE Telephone fees are the responsibility of the caller. Rates may vary. Contact your local telephone company for current rates.

Product Registration

To register your HP Jetdirect print server, use the following HP Web page:

http://www.hp.com/go/jetdirect_register

Product Accessibility

For information on HP's commitment to accessibility of HP Jetdirect print server products:

- Visit the HP Web site at: http://www.hp.com/accessibility
- Send email to: accessibility@hp.com

2 HP Software Solutions Summary

HP provides a variety of software solutions to set up or manage your HP Jetdirect-connected network devices. See Table 2-1 Software Solutions to help you determine which software is best for you.

NOTE For more information on these and other solutions, visit HP online support at:

http://www.hp.com/support/net_printing

Table 2-1 Software Solutions

Operating Environment	Function	Remarks
HP Install Network Printer Wizard (Windows)		
Windows 98, Me, 2000, XP, Server 2003 For TCP/IP direct-mode printing. TCP/IPv4 and TCP/IPv6	**HP Jetdirect 635n print servers**: Version 5.0 is required for IPv6 printing on supported systems (Windows XP and Server 2003), but supports printer discovery through IPv4 protocols only. **HP Jetdirect Wired or Wireless print servers**: Once the printer is connected to your network, allows you to install (or add) a single network printer on your system for direct-mode (peer-to-peer) printing. For a network server, you can share the printer for client-server (shared) printing. **Wireless print servers**: With version 4.0 (and later), allows you to configure wireless parameters for an 802.11g wireless connection to your network.	■ Simple printer setup and installation. ■ Runs from CD-ROM ■ Installable version that runs from your hard disk is available for download from HP's Website.
HP Jetdirect Printer Installer for UNIX		
HP-UX 10.x-10.20, 11.x Solaris 2.6, 7, 8 (SPARCsystems only) TCP/IPv4	Fast and easy installation of HP Jetdirect-connected printers on an IPv4 network.	■ Supplied on the HP Jetdirect CD-ROM, and may be downloaded from HP's Website
HP Web Jetadmin		
(See the HP Website for supported system updates.) Windows 2000, XP Professional, Server 2003	Remote installation, configuration, and management of HP Jetdirect-connected print servers, non-HP printers that support the standard MIBs, and printers with embedded Web servers.	■ HP's preferred solution for ongoing management and installation of multiple printers anywhere on your intranet ■ Browser-based management

Table 2-1 Software Solutions (continued)

Operating Environment	Function	Remarks
HP-UX[1] Solaris[1] Fedora Core and SuSE Linux NetWare[1] TCP/IPv4, IPX/SPX	Alerts and consumables management. Remote firmware upgrades for HP Jetdirect print servers. Asset tracking and utilization analysis.	
Internet Printer Connection Software		
Windows NT 4.0, 2000 (Intel-based) TCP/IPv4 **NOTE** Microsoft Internet Printing software is also integrated with Windows 2000, XP, Server 2003.	Printing through the Internet to Internet Printing Protocol (IPP)-enabled HP Jetdirect-connected printers.	■ Allows economical distribution of high-quality hardcopy documents over the Internet, replacing fax, mail, and overnight services ■ Requires HP Jetdirect print server (firmware version x.20.00 or later)
HP LaserJet Utilities for Mac OS		
Mac OS 9.x AppleTalk	Configuration and management of HP Jetdirect-connected printers.	■ May be downloaded from HP's Website.

[1] Supports queue creation and peripheral management from HP Web Jetadmin hosted on a supported system.

HP Install Network Printer Wizard (Windows)

The HP Install Network Printer Wizard (version 5.0) is a utility for printer discovery, setup and installation on a TCP/IP network. On Windows XP and 2003 Server systems, Version 5.0 also supports printing on an IPv6 network, but printer discovery is limited to IPv4 protocols.

For wireless print servers, the wizard includes modules that allow you to first configure wireless settings on the print server so that it can connect to your network.

Once your printers have a network connection (either through a cabled/wired connection or a wireless connection), the wizard installs the printer on your systems or servers that will send print jobs directly to the printer. This is called “direct-mode”, or “peer-to-peer” printing.

If your system is a server, you can share the printer so that network clients can use the printer through the server, also known as “client-server” printing.

The HP Install Network Printer Wizard is included on the HP Jetdirect CD-ROM supplied with standalone HP Jetdirect products. The wizard is run through the **Install** selection on the Jetdirect CD-ROM interface. The wizard runs from the CD-ROM, although some files may be temporarily stored and then removed from your system disk after a system reboot.

A version that runs from your system disk is also available and can be downloaded from HP online support at:

http://www.hp.com/go/inpw_sw

Requirements

- Microsoft Windows XP, Windows 2000, Windows 98/Me, Server 2003
  - TCP/IP networks
- The proper printer software (printer driver) to use with your printer and operating system
- Printer connection to the network through an HP Jetdirect print server

HP Jetdirect Printer Installer for UNIX

The HP Jetdirect Printer Installer for UNIX contains support for HP-UX and Solaris systems. The software installs, configures and provides diagnostics capabilities for HP printers connected to TCP/IPv4 networks using full-featured HP Jetdirect print servers.

The software is distributed through the following methods:

- HP Jetdirect CD-ROM, provided with standalone HP Jetdirect print servers
- Anonymous FTP site at ftp.hp.com (Directory: /pub/networking/software)
- HP online support at:

  http://www.hp.com/support/net_printing

For system requirements and installation information, see the documentation provided with the software.

HP Web Jetadmin

HP Web Jetadmin is an enterprise management tool that allows you to remotely install, configure and manage a wide variety of HP and non-HP network printing devices simply through a standard Web browser. HP Web Jetadmin can be used to proactively manage both individual or groups of devices.

While HP Web Jetadmin supports devices that contain Standard Printer MIB (Management Information Base) objects for common management, it is well-integrated with HP Jetdirect print servers and HP printers to provide enhanced management features.

To use HP Web Jetadmin, see the online help and documentation supplied with the software.

System Requirements

HP Web Jetadmin software runs on Microsoft Windows 2000, Windows XP Professional, Windows Server 2003, and selected Linux (Fedora Core and SuSE Linux) systems. For information on supported operating systems, clients, and compatible browser versions, visit HP online support at http://www.hp.com/go/webjetadmin.

NOTE When installed on a supported host server, HP Web Jetadmin can be accessed from any client through a compatible Web browser by browsing to the HP Web Jetadmin host. This allows printer installation and management on Novell NetWare and other networks.

Installing HP Web Jetadmin

Before installing the HP Web Jetadmin software, you must have administrator or root privileges on the local system:

1. Download the installation files from HP online support at http://www.hp.com/go/webjetadmin.
2. Follow the instructions on the screen to install the HP Web Jetadmin software.

NOTE Installation instructions are also contained in the HP Web Jetadmin install file.

Verifying Installation and Providing Access

- Verify that the HP Web Jetadmin software is correctly installed by navigating to it with your browser as shown in the following example:

  `http://systemname.domain:port/`

  where `systemname.domain` is the host name of your Web server and `port` is the port number assigned during installation. By default, the port number is 8000.

- Provide users access to HP Web Jetadmin software by adding a link to your Web server's home page that is addressed to HP Web Jetadmin's URL. For example:

  `http://systemname.domain:port/`

Configuring and Modifying a Device

Using your browser, navigate to HP Web Jetadmin's URL. For example:

```
http://systemname.domain:port/
```

NOTE In place of `systemname.domain`, the IPv4 address of the host computer on which HP Web Jetadmin is installed can be used.

Follow the instructions on the appropriate home page to find and manage your printer.

Removing HP Web Jetadmin Software

To remove HP Web Jetadmin software from your Web server, use the uninstall program provided with the software package.

Internet Printer Connection Software

HP Jetdirect 635n print servers support the Internet Printing Protocol (IPP and Secure IPP).

Using the appropriate software on your system, you can create an IPP print path from your system to a supported HP Jetdirect-connected printer over the Internet.

NOTE For incoming print path requests, the network administrator must configure the firewall to accept incoming IPP requests. Security features available in the software are currently limited.

Features and benefits provided by Internet printing include:

- High-quality, time-sensitive documents can be printed remotely, in full-color or black-and-white
- Documents can be printed remotely at a fraction of the cost of current methods (such as fax, mail, or overnight delivery services)
- The traditional LAN printing model can be extended to that of an Internet Printing Model
- IPP requests for sending print jobs can be transmitted outbound through firewalls

HP-Supplied Software

HP Internet Printer Connection software allows you to set up Internet printing from Windows NT 4.0 and Windows 2000 clients.

1. To obtain the software:

   Download the HP Internet Printer Connection software from HP online support at:

   http://www.hp.com/go/ipc_sw

2. To install the software and set up the print path to the printer, follow the instructions provided with the software. Contact your network administrator to get the IP address or URL of the printer to complete the setup.

HP Software System Requirements

- Computer running Microsoft Windows NT 4.0 (Intel-based) or Windows 2000
- IPP-enabled HP Jetdirect print server

HP Software Supported Proxies

Web proxy with support for HTTP v1.1 or greater (may not be needed if printing over an intranet).

Microsoft Supplied Software

NOTE Contact Microsoft for support of Windows IPP software.

Windows 2000/XP/Server 2003 Integrated Software

On Windows 2000/XP/Server 2003 systems, an alternative to using the HP supplied software is to use the IPP-client software integrated with the Windows system. The IPP implementation on the HP Jetdirect print server is compatible with the Windows system IPP-client software.

To set up a print path to an HP Jetdirect-connected Internet printer using the Windows 2000/XP IPP-client software, proceed as follows:

1. Open the **Printers** folder (click **Start**, select **Settings**, and select **Printers**).
2. Run the Add Printer wizard (double-click **Add Printer**), then click **Next**.
3. Select the option for a **Network printer** and click **Next**.
4. Select **Connect to a printer on the Internet** and enter the print server's URL:

   `http://IP_address[/ipp/port#]`

   where *`IP_address`* is the IPv4 address configured on the HP Jetdirect print server. `[/ipp/port#]` identifies the port number, which is port 1 for single-port print servers (default is /ipp/port1).

Example:	
http://192.160.45.40	An IPP connection to an HP Jetdirect print server with IPv4 address 192.160.45.40. ("/ipp/port1" is assumed and not required.)

   NOTE For a Secure IPP connection, replace `http://` with `https://` in the URL string above.

   Click **Next**.
5. You will be prompted for a printer driver (the HP Jetdirect print server does not contain printer drivers, so your system cannot automatically obtain the driver). Click **OK** to install the printer driver onto your system and follow the instructions on the screen. (You may need your printer CD-ROM to install the driver.)
6. To complete the print path setup, follow the instructions on the screen.

Windows Me IPP Client

The IPP implementation on the HP Jetdirect print server is compatible with Windows Me IPP-client software. The IPP client is installed from the **Add-Ons** folder on the Windows Me CD-ROM. For installation and setup of a Windows Me IPP client, see the instructions provided with the Windows Me CD-ROM.

Novell Supplied Software

The HP Jetdirect print server is compatible with IPP running on NetWare 5.1 with SP1 or later. For NetWare client support, refer to your NetWare technical documentation or contact Novell.

HP LaserJet Utilities for Mac OS

NOTE The HP LaserJet Utilities for Mac OS allow you to configure and manage your HP Jetdirect-connected printers on networks that use the AppleTalk (EtherTalk) protocol.

On TCP/IPv4 networks, you can use Mac OS system utilities to discover and install your printer. On Mac OS 9.x systems, use the Apple Desktop Printer Utility to set up LPR/LPD printing. On Mac OS X 10.x systems, use the Print Center or mDNS applications for IP Printing.

TCP/IP printer configuration is also supported through other tools, such as Web browser access to the embedded Web server on the print server.

Installing the Printer Software

To install the printer software for Mac OS systems, follow the instructions in the documentation supplied with your printer. If you are installing the HP LaserJet Utility from the HP Jetdirect CD-ROM, use the following installation instructions.

NOTE If you are installing the HP LaserJet Utility from a source other than the CD-ROM, see the README file that accompanies the software for installation instructions.

Automatic virus detection programs might interfere with the installation of this software. Turn off any such programs that are active on your Mac OS computer before proceeding with the installation process.

1. Insert the CD-ROM into the CD-ROM drive.
2. In the **HP Installer** window, double-click the installation icon for the software in the language you want.
3. Follow the instructions on the screen.

For more information about configuring your printer driver, see the online documentation provided on the CD-ROM that came with the printer.

Configuring the Printer

The HP LaserJet Utility allows printer settings such as printer name and preferred zone to be configured from your Mac OS system. Hewlett-Packard recommends that only network administrators use the printer configuration capabilities of this utility.

If this printer is to be serviced by a print spooler, set up the printer's name and zone before configuring the spooler to capture the printer.

Running the HP LaserJet Utility

1. With the printer turned on and online, and the print server connected to the printer and to the network, double-click the **HP LaserJet Utility** icon.
2. If the printer's name is not listed as the target printer, click **Select Printer**. The **Select a Target** Printer window appears.
   - Select the zone, if necessary, from the AppleTalk Zones list in which the printer resides. The zone the printer is in is shown on the configuration page. See the hardware installation guide for your print server or your printer's Getting Started guide for instructions on printing a configuration page.
   - Select the printer from the **Available Printers** list and click **OK**.

Verifying Network Configuration

To verify your current network configuration, print a Jetdirect configuration page. If you have not printed a configuration page from your printer, see your printer documentation for instructions (see HP Jetdirect Configuration Pages for more information). If your printer has a control panel, make sure a **READY** message appears on the control panel for at least 1 minute, then print the page. The current configuration is listed under “AppleTalk” on the configuration page.

NOTE If you have multiple printers on your network, you need to print a configuration page to identify the printer's name and zone.

Renaming the Printer

The factory supplies a default name for your printer. **Hewlett-Packard highly recommends that you rename your printer to avoid having multiple printers with similar names on your network**.

CAUTION After you have renamed the printer and have set up print queues to that printer, use caution when changing the printer name again. If you rename the printer again, the queues for that printer will no longer function.

NOTE The name may be up to 32 characters in length. A warning beep indicates that an illegal character was typed. For illegal characters, see the Help system integrated with the software.

You can name your printer anything you like—for example, “Michael's LaserJet 4000.” The HP LaserJet Utility has the ability to rename devices located in different zones, as well as the local zone (no zones need to be present in order to use the HP LaserJet Utility).

1. Select the **Settings** icon from the scrolling icon list. The **Please select a setting**: dialog appears.
2. Select **Printer Name** in the list.
3. Click **Edit**. The **Set Printer Name** dialog box appears.
4. Type the new name.
5. Click **OK**.

NOTE If you try to name your printer the same name as another printer, an alert dialog box appears directing you to select another name. To select another name, repeat steps 4 and 5.

6 If your printer is on an EtherTalk network, continue with the next section, "Selecting a Zone."

7 To exit, select **Quit** from the **File** menu.

Notify everyone on your network of the new name for your printer so they can select the printer in the Chooser.

Selecting a Zone

The HP LaserJet Utility allows you to select a preferred zone for your printer on a Phase 2 EtherTalk network. Instead of your printer remaining on the default zone, which is set by the router, this utility lets you select the zone on which your printer appears. The zones on which your printer can reside are limited by your network configuration. **The HP LaserJet Utility only enables you to select a zone that is already configured for your network**.

Zones are groups of computers, printers, and other AppleTalk devices. They can be grouped by physical location (for example, Zone A may contain all the printers on the network in building A). They may also be grouped logically (for example, all printers used in the finance department).

1 Select the **Settings** icon from the scrolling icon list. The **Please Select a Setting**: dialog box appears.

2 Select **Printer Zone** in the list and click **Edit**. The **Select a Zone** dialog box appears.

3 Select your preferred network zone from the **Select a Zone**: list and click **Set Zone**.

4 To exit, select **Quit** from the **File** menu.

Notify everyone on your network of the new zone for your printer so they can select the printer in the Chooser.

Selecting Your Printer

1 Select the **Chooser** from the **Apple** menu.

2 Select the printer icon for use with your printer. If the appropriate printer icon does not appear in the Chooser, or you are not sure which icon to select for your printer, see "Installing the Printer Software" in this chapter.

3 If AppleTalk is not active, an alert dialog box appears on your screen. Select **OK**. The **Active** button turns on.

If your network is linked to other networks, the **AppleTalk Zones** list dialog box appears in the Chooser.

4 If applicable, select the zone in the **AppleTalk Zones** scrolling list where your printer is located.

5. Select the printer name you want to use from the list of printer names in the upper-right area of the Chooser. If the printer's name does not appear in the list, make sure the following tasks have been performed:

   - the printer is turned on and is online.
   - the print server is connected to the printer and to the network.
   - the printer cable connections are secure.

   A **READY** message should appear if the printer has a control panel display. See Troubleshooting the HP Jetdirect Print Server for more information.

   NOTE **If your printer is the only name listed in the dialog box, you must still select it**. Your printer remains selected until you select a different printer with the Chooser.

6. Click **Setup** or **Create** in the Chooser; then, if prompted, select the appropriate PostScript Printer Description file (PPD) for the printer. For more information, see the online documentation.

7. Set **Background Printing** to **ON** or **OFF**.

   If background printing is turned **OFF** when you send a print job to the printer, status messages appear on your screen and you have to wait until the messages clear before continuing your work. If background printing is turned **ON**, the messages are redirected to the PrintMonitor and you can continue working while the printer is printing your job.

8. Exit the Chooser.

To display your user name on the network when you are printing documents, go into the Control Panel on your Mac OS computer, select **Sharing Setup**, then type your owner name.

Testing the Configuration

1. Select **Print Window** from the **File** menu, or if no window is open, select **Print Desktop**.

   The **Print** dialog box appears.

2. Click **Print**.

   If the printer prints the job, you have connected your printer to your network correctly. If your printer does not print, see Troubleshooting the HP Jetdirect Print Server.

3 TCP/IP Configuration

To operate properly on a TCP/IP network, the HP Jetdirect print server must be configured with valid TCP/IP network configuration parameters, such as an IP address that is valid for your network.

HP Jetdirect 635n print server supports both IPv4 and IPv6 networks simultaneously. Print server configuration for IPv4 operation remains the same as prior Jetdirect products.

IPv6 Configuration

HP Jetdirect 635n print servers provide basic configuration capabilities for operation on an Internet Protocol version 6 (IPv6) network. For IPv6 printing services, the print server supports raw IP printing (through HP-proprietary TCP port 9100) and LPD printing (through standard TCP port 515).

The print server supports remote configuration by DHCPv6 servers and IPv6 routers. In addition, it supports remote configuration and management from a Web browser over HTTP or HTTPS. Local configuration of basic IPv6 parameters is available through the printer control panel if supported by the printer.

IPv6 Address Introduction

An IPv6 address consists of 128 bits. The normal format of an IPv6 address is eight fields, each separated by a colon (:). Each field contains four hexadecimal digits representing 16 bits:

`hhhh:hhhh:hhhh:hhhh:hhhh:hhhh:hhhh:hhhh`

where h is a hexadecimal digit 1 through 0, A through F. This is sometimes called *colon hexadecimal* format.

Depending on the application, an IPv6 address may be entered or displayed using a shortened version when successive fields contain all zeros (0). In this case, two colons (::) are used. In addition, leading zeros in a field can be omitted. For example, the following IPv6 address:

`2001:0DB8:0000:0000:0000:0000:0200:bb02`

may be entered or displayed as

`2001:DB8::200:bb02`

However, the use of two colons to represent successive zero fields can be used only once in an address.

IPv6 addresses are often specified by a *prefix* that identifies a fixed value associated with the first part of the address, followed by a *prefix length* that specifies the number of bits in the prefix. In IPv6 addressing, a prefix length of 64 is typically used to specify a network or subnet. A prefix with a prefix length less than 64 typically identifies a portion of the IPv6 address space or a route.

For example, portions of the IPv6 address space that are reserved are illustrated below:

- `2001:DB8::/32` (reserved for use only as examples in documentation)
- `FE80::/10` (reserved for link-local addresses only)

IPv6 addresses do not use subnet masks as in IPv4 formats. Instead, the prefix length may be used to specify an entire network/subnet. Or, it may be used to specify the network portion of a complete host address. For example, in the following host address:

`2001:DB8:1234:5678:abcd::ef01/64`

`/64` is the prefix length and indicates that `2001:DB8:1234:5678` is the network/subnet for the specific host uniquely identified by `abcd::ef01`.

For a more thorough discussion of IPv6 address formats and types, refer to the Internet Engineering Task Force (IETF) IPv6 RFCs, or see the documentation supplied with your IPv6–supported system or router.

IPv6 Address Configuration

While IPv6 addresses are relatively complex, most IPv6 addresses for the print server are automatically configured in accordance with the IPv6 standards. If necessary, the print server will allow a manually-configured IPv6 address (for example, through the printer control panel or embedded Web server). If the print server is enabled for IPv6 operation, all IPv6 addresses that are automatically configured are active; however, a manually-configured address is disabled by default and must be manually enabled.

Stateless addresses assigned to the print server are under the control of a router. Stateful addresses are normally assigned by a DHCPv6 server under the direction of a router; however, the print server can be configured to always use stateful configuration, or to use stateful configuration if stateless configuration fails.

Link-Local Address

IPv6 link-local addresses are automatically self-configured and allow IPv6 communications between hosts connected to the same link (routers do not forward link-local addresses). Because each IPv6 host on a local network will assign itself a link-local address, a router-based infrastucture is not required.

When the print server creates a link-local address, the link-local prefix `FE80::/10` is combined with a 64-bit host address (derived from the print server's MAC address) in accordance with a predefined algorithm.

For example, a print server with MAC address 00–0E-7F-E8–01–DD results in the following link-local address:

`FE80::20e:7FFF:FEE8:1DD`

The use of link-local IPv6 addressing is particularly attractive for small, configuration-free networks.

Stateless Addresses

Stateless addresses are usually assigned to the print server under router control, and *not* by a server (such as a DHCPv6 server). However, the router can specify that other configuration be provided by a server.

The print server must receive Router Advertisement messages which are periodically sent by a router. These messages, among other things, contain one or more IPv6 prefix options (for example, specifying 64–bit local subnets, or a default route). These prefixes are combined with a 64-bit host address (derived from the print server's MAC address) to form the IPv6 stateless addresses configured on the print server.

Stateless addressing may be preferred for networks that require traffic to be routed but with minimal network configuration.

Stateful Addresses

A DHCPv6 server configures stateful IPv6 addresses on HP Jetdirect print servers. A DHCPv6 policy on the print server determines when a DHCPv6 server is to be used for stateful configuration. You can select one of the following DHCPv6 policies for the print server to use:

- **Under router control**: (default) DHCPv6 stateful configuration will be used when requested by the router.
- **Stateless configuration fails**: Use DHCPv6 stateful configuration if stateless configuration fails.
- **Always use DHCPv6**: On startup, always use DHCPv6 for stateful configuration.

Stateful configuration is useful when host configuration beyond what a router can provide is necessary (such as a domain name or DNS server addresses).

Using DNS

HP Jetdirect print servers support the configuration of IPv6 Domain Name System (DNS) servers for the print server.

Due to IPv6 address length and complexity, specifying an IPv6 address in applications to identify or search for a device may be cumbersome. Some client applications may not even support the direct entry of an IPv6 address. However, name resolution may be available for the print server provided the appropriate IPv6 records are configured in DNS. If name resolution is supported, you can enter the print server's host name or a fully qualified domain name (FQDN) when using these applications.

NOTE The print server does not support dynamic updates to DNS; IPv6 addresses will not be automatically supplied to DNS servers.

Tools and Utilities

Similar to IPv4 environments, system tools and utilities for IPv6 networks are available to access or troubleshoot communications with the print server. However, these tools and utilities may require different command formats depending on your system. Some examples are listed below.

- **ipconfig /all** or **ipv6 if**: From the Windows command line prompt, these commands will identify IPv6 addresses for various interfaces configured on the system. Note that an interface IPv6 address may contain a *ScopeID*, which is an interface index identifier (for example, “%3”) appended to a link-local IPv6 address.
- **ping6**: From the Windows command line prompt, this command sends test packets to a remote interface and reports response packets from that interface. The command format is:

  ```
  ping6 <IPv6 address><%ScopeID>
  ```

  where <IPv6 address> is the address of the remote host interface (such as the print server). The <%ScopeID> value may be needed to uniquely specify the interface on the local system if it is configured with multiple link-local IPv6 addresses.

  For example, if the print server's link-local IPv6 address is fe80::20e:7fff:fee8:1dd, and the Windows system contains a LAN interface with %3 appended to its link-local address, you would use the following command:

  ```
  ping6 fe80::20e:7fff:fee8:1dd%3
  ```

  Note that depending on the local interface used, a route to the remote host address may need to be created.
- **IPv6 addresses as URL**: As a URL in a Web browser, an IPv6 address must be enclosed in brackets. For example, to access the print server's embedded Web server, enter:

  ```
  http://[fe80::20e:7fff:fee8:1dd]
  ```

  where `fe80::20e:7fff:fee8:1dd` is the IPv6 address of the print server.

  NOTE The browser must support direct IPv6 addressing as a URL, such as Mozilla Firefox 1.x. Your Microsoft Internet Explorer version may not support direct IPv6 addressing.

For detailed information on these and other tools, see your system documentation and help.

IPv4 Configuration

This section provides IPv4–specific configuration information for HP Jetdirect 635n print servers on a TCP/IPv4 network.

Server-Based and Manual TCP/IP Configuration (IPv4)

When in a factory-default state and powered on, the HP Jetdirect print server will try to obtain its TCP/IP configuration using a server-based method, such as BOOTP/TFTP, DHCP/TFTP, or RARP. These server-based methods are described later in this chapter. Depending on the print server model, up to two minutes may be used for these methods. If configuration is not successful, a default IP address will be assigned.

The print server may also be configured manually. Manual-based tools include Telnet, a Web browser, the printer control panel, arp and ping commands (when the default IP address is 192.0.0.192), or SNMP-based management software. TCP/IP configuration values assigned manually will be retained when powered off/on.

The print server can be reconfigured to use either server-based or manual configuration of TCP/IP settings at any time.

To identify the IP address that is configured on the print server at any time, see the HP Jetdirect configuration page.

Default IP Address (IPv4)

When in a factory-default state (for example, when shipped from the factory or after a cold-reset), the HP Jetdirect print server has no IP address. A default IP address may or may not be assigned depending on the network environment.

Default IP Address Will Not Be Assigned

A default IP address will not be assigned if a server-based method (such as BOOTP or DHCP) is successful. And if the print server is powered off/on, the same method will again be used to retrieve IP configuration settings. If this method now fails to retrieve the IP configuration settings (for example, the BOOTP or DHCP server is no longer available), a default IP address will not be assigned. Instead, the print server will continue to send IP configuration requests indefinitely. You must cold-reset the print server to change this behavior.

In addition, a default IP address will not be assigned if a network cable is not attached to a wired print server.

Default IP Address Will Be Assigned

A default IP address will be assigned if the factory-default methods fail, or if the print server has just been reconfigured by an administrator to use a server-based method (such as BOOTP or DHCP) that fails.

If a default IP address is assigned, the address will depend on the network to which the print server is connected. The print server senses broadcast packets on the network to determine the appropriate default IP settings:

- On small private networks that adhere to automated, standards-based IP address assignments, the print server uses a link-local addressing technique to assign a unique IP address. Link-local addressing is limited to a local IP subnet (not routed) and may be referenced as **Auto IP**. The IP address assigned will be in the range of 169.254.1.0 to 169.254.254.255 (commonly referenced as 169.254/16). However, it can be further modified for your network using supported TCP/IP configuration tools if necessary.

  With link-local addresses, subnetting is not used. The subnet mask will be 255.255.0.0, and cannot be changed.

  Link-local addresses will not route off the local link, and access to or from the Internet will not be available. The default gateway address will be the same as the link-local address.

  If a duplicate address is sensed, the HP Jetdirect print server will automatically reassign its address, if necessary, in accordance with standard link-local addressing methods.

- On large or enterprise IP networks, a temporary address of 192.0.0.192 will be assigned until it is reconfigured with a valid address through supported TCP/IP configuration tools. We refer to this address as **Legacy Default IP**.

- On mixed-environment networks, the self-assigned default IP address may be either 169.254/16 or 192.0.0.192. In this case, you should verify on the Jetdirect configuration page that the assigned default IP address is as expected.

The IP address configured on your print server may be determined by inspecting the Jetdirect configuration page for the print server. See HP Jetdirect Configuration Pages.

Default IPv4 Address Configuration Options

Default IPv4 Parameter

A Default IP configuration parameter on the print server controls how the default IPv4 address is assigned. Whenever the print server is unable to obtain an IP address during a forced TCP/IP reconfiguration (for example, when manually configured to use BOOTP or DHCP), this parameter will determine the default IPv4 address to use.

When the print server is in a factory-default state, this parameter is undefined.

If the print server is initially configured with a default IPv4 address (either a link-local IPv4 address or the legacy default 192.0.0.192 IP address), the Default IP parameter will be set to either **Auto IP** or **Legacy Default IP** to match.

The Default IP parameter can be changed through a supported configuration tool, such as Telnet, a Web browser, a printer control panel, and SNMP management applications.

DHCP Requests Enable/Disable

When a default IPv4 address is assigned, you can configure the print server to send, or not send, periodic DHCP requests. DHCP requests are used to retrieve IP configuration settings from a DHCP server on the network. By default, this parameter is enabled, allowing DHCP requests to be transmitted. However, this parameter may be disabled through supported configuration tools such as Telnet, a Web browser, and SNMP management applications.

Default IPv4 Behavior

When powered on, a factory-default print server connected to a network through a cable (wired) will systematically use BOOTP, DHCP, and RARP to retrieve its IPv4 settings. Up to two minutes are used. If configuration is not successful, a default IPv4 address will be assigned as described previously.

Configuration tools that require a specific default IP address on the print server for initial communication may not work without modification. For the default IP address settings actually configured on the print server, see the Jetdirect configuration page.

TCP/IP Configuration Tools

When a network connection has been established, an HP Jetdirect print server can be configured with valid TCP/IP parameters for your network in the following ways:

- **Using Software**. You can use installation, setup, and management software running on supported systems. For more information see HP Software Solutions Summary.
- **BOOTP/TFTP**. You can download the data from a network-based server using BOOTP (Bootstrap Protocol) and TFTP (Trivial File Transfer Protocol) each time the printer is turned on. For more information, see "Using BOOTP/TFTP (IPv4)".

  The BOOTP daemon, bootpd, must be running on a BOOTP server that is accessible by the printer.
- **DHCP/TFTP**. You can use Dynamic Host Configuration Protocol (DHCP) and TFTP (Trivial File Transfer Protocol) each time the printer is turned on. These protocols are supported on HP-UX, Solaris, Linux, Windows NT/2000/Server 2003, NetWare and Mac OS systems. (Refer to your network operating system manuals to verify that your server operating system supports DHCP.) For more information, see "Using DHCP (IPv4)".

  NOTE Linux and UNIX systems: For more information, see the bootpd "`man`" page.

  On HP-UX systems, a sample DHCP configuration file (dhcptab) may be located in the `/etc` directory.

  Since HP-UX presently does not provide Dynamic Domain Name Services (DDNS) for its DHCP implementations, HP recommends that you set all print server lease durations to *infinite*. This ensures that print server IP addresses remain static until such time as Dynamic Domain Name Services are provided.
- **RARP**. A network-based server can use RARP (Reverse Address Resolution Protocol) to answer the print server's RARP request and supplying the print server with the IP address. The RARP method only allows you to configure the IP address. For more information, see "Using RARP (IPv4)".
- **arp and ping commands**. (For print servers configure with Legacy default IP address 192.0.0.192 only) You can use the `arp` and `ping` commands from your system. For more information, see "Using the arp and ping Commands (IPv4)".
- **Telnet**. You can set configuration parameters using Telnet. In order to set configuration parameters, set up a Telnet connection from your system to the HP Jetdirect print server using the default IP address. Once configured, the print server saves the configuration when powered off/on. For more information, see "Using Telnet (IPv4)".

- **Embedded Web server**. You can browse to the embedded Web server on the HP Jetdirect print server to set configuration parameters. For more information, see HP Jetdirect Embedded Web Server (V.31.xx).
- **Printer Control Panel**. (For printers that support Jetdirect control panel menus) You can manually enter the configuration data using the printer control panel keys. The control panel method allows you to configure only a limited subset of configuration parameters. Therefore, control panel configuration is recommended only during troubleshooting or for simple installations. If control panel configuration is used, the print server saves the configuration when powered off/on. For more information, see "Using the Printer Control Panel".

Using BOOTP/TFTP (IPv4)

BOOTP (Bootstrap Protocol) and TFTP (Trivial File Transfer Protocol) provide a convenient way to automatically configure the HP Jetdirect print server for TCP/IPv4 network operation. When powered on, the Jetdirect print server sends a BOOTP request message onto the network. A properly configured BOOTP server on the network will respond with a message that contains basic network configuration data for the Jetdirect print server. The BOOTP server's response may also identify a file that contains extended configuration data for the print server. The Jetdirect print server downloads this file using TFTP. This TFTP configuration file may be located on the BOOTP server, or a separate TFTP server.

BOOTP/TFTP servers are typically UNIX or Linux systems. Windows NT/2000/Server 2003 and NetWare servers can respond to BOOTP requests. Windows NT/2000/Server 2003 servers are configured through Microsoft DHCP services (see Using DHCP (IPv4)). However, Windows NT/2000/Server 2003 systems may require third-party software for TFTP support. For setup of NetWare BOOTP servers, refer to your NetWare documentation.

NOTE If the Jetdirect print server and BOOTP/DHCP server are located on different subnets, IPv4 configuration may fail unless the routing device supports "BOOTP Relay" (allows the transfer of BOOTP requests between subnets).

Why Use BOOTP/TFTP?

Using BOOTP/TFTP to download configuration data has the following benefits:

- Enhanced configuration control of the HP Jetdirect print server. Configuration by other methods, such as a printer control panel, are limited to select parameters.
- Ease of configuration management. Network configuration parameters for the entire network can be in one location.
- Ease of HP Jetdirect print server configuration. Complete network configuration can be automatically downloaded each time the print server is powered on.

NOTE BOOTP operation is similar to DHCP, but the resulting IP parameters will be the same when powered off/on. In DHCP, IP configuration parameters are leased and may change over time.

When in its factory-default state and powered on, the HP Jetdirect print server will attempt to automatically configure itself using several dynamic methods, one of which is BOOTP.

BOOTP/TFTP on UNIX

This section describes how to configure the print server using BOOTP (Bootstrap Protocol) and TFTP (Trivial File Transfer Protocol) services on UNIX servers. BOOTP and TFTP are used to download network configuration data from a server to the HP Jetdirect print server over the network.

Systems That Use Network Information Service (NIS)

If your system uses NIS, you may need to rebuild the NIS map with the BOOTP service before performing the BOOTP configuration steps. Refer to your system documentation.

Configuring the BOOTP Server

For the HP Jetdirect print server to obtain its configuration data over the network, the BOOTP/TFTP servers must be set up with the appropriate configuration files. BOOTP is used by the print server to obtain entries in the `/etc/bootptab` file on a BOOTP server, while TFTP is used to obtain additional configuration information from a configuration file on a TFTP server.

When the HP Jetdirect print server is powered on, it broadcasts a BOOTP request that contains its MAC (hardware) address. A BOOTP server daemon searches the `/etc/bootptab` file for a matching MAC address, and if successful, sends the corresponding configuration data to the Jetdirect print server as a BOOTP reply. The configuration data in the `/etc/bootptab` file must be properly entered. For a description of entries, see “Bootptab File Entries (IPv4)”.

The BOOTP reply may contain the name of a configuration file containing enhanced configuration parameters. If the HP Jetdirect print server finds such a file, it will use TFTP to download the file and configure itself with these parameters. For a description of entries, see “TFTP Configuration File Entries (IPv4)”. Configuration parameters retrieved through TFTP are optional.

NOTE HP recommends that the BOOTP server be located on the same subnet as the printers it serves. **BOOTP broadcast packets may not be forwarded by routers unless the routers are properly configured**.

Bootptab File Entries (IPv4)

An example of a `/etc/bootptab` file entry for IPv4 configuration of an HP Jetdirect print server is provided below:

```
picasso:\
    :hn:\
    :ht=ether:\
    :vm=rfc1048:\
    :ha=0001E6123456:\
    :ip=192.168.40.39:\
    :sm=255.255.255.0:\
    :gw=192.168.40.1:\
    :lg=192.168.40.3:\
    :T144="hpnp/picasso.cfg":
```

Note that the configuration data contains “tags” to identify the various HP Jetdirect parameters and their settings. Entries and tags supported by the HP Jetdirect print server are listed in the following table.

Table 3-1 Tags Supported in a BOOTP/DHCP Boot file

Item	RFC 2132 Option	Description
`nodename`	--	The name of the peripheral. This name identifies an entry point to a list of parameters for a specific peripheral. `nodename` must be the first field in an entry. (In the example above, `nodename` is “picasso”.)
`ht`	--	The hardware type tag. For the HP Jetdirect print server, set this to `ether` (for Ethernet). This tag must precede the `ha` tag.
`vm`	--	The BOOTP report format tag (required). Set this parameter to `rfc1048`.
`ha`	--	The hardware address tag. The hardware (MAC) address is the link-level, or station address of the HP Jetdirect print server. It can be found on the HP Jetdirect configuration page as the **HARDWARE ADDRESS**.
`ip`	--	The IP address tag (required). This address will be the HP Jetdirect print server's IP address.
`sm`	1	The subnet mask tag. The subnet mask will be used by the HP Jetdirect print server to identify the portions of an IP address that specify the network/subnetwork number and the host address.
`gw`	3	The gateway IP address tag. This address identifies the IP address of the default gateway (router) that the HP Jetdirect print server will use for communications with other subnets.
`ds`	6	DNS (Domain Name System) server's IP address tag. Only a single name server can be specified.
`lg`	7	The syslog server's IP address tag. It specifies the server that the HP Jetdirect print server sends syslog messages to.
`hn`	12	The host name tag. This tag does not take a value but causes the BOOTP daemon to download the host name to the HP Jetdirect print server. The host name will be printed on the Jetdirect configuration page, or returned on an SNMP sysName request by a network application.
`dn`	15	Domain name tag. Specifies the domain name for the HP Jetdirect print server (for example, support.hp.com). It does not include the host name; it is not the Fully Qualified Domain Name (such as printer1.support.hp.com).
`ef`	18	Extensions file tag that specifies the relative path name of the TFTP configuration file. **NOTE** This tag is similar to the vendor-specific tag T144, described below.
`na`	44	Tag for IP addresses of the NetBIOS-over-TCP/IP Name Server (NBNS). A primary and secondary server may be specified in order of preference.
`lease-time`	51	DHCP IP address lease duration time (seconds).
`tr`	58	DHCP T1 timeout, specifying the DHCP lease renewal time (seconds).
`tv`	59	DHCP T2 timeout, specifying the DHCP lease rebind time (seconds).
`T69`	69	The IP address (in hexadecimal) of the preferred outgoing e-mail SMTP (Simple Mail Transport Protocol) server, for use with supported Scan devices.
`T144`	--	An HP-proprietary tag that specifies the relative path name of the TFTP configuration file. Long path names may be truncated. The path name must be in double quotes (for example, *“pathname”*). For file format information, refer to “TFTP Configuration File Entries (IPv4)”.

Table 3-1 Tags Supported in a BOOTP/DHCP Boot file (continued)

Item	RFC 2132 Option	Description
		NOTE Standard BOOTP option 18 (extensions file path) also allows a standard tag (**ef**) to specify the relative path name of the TFTP configuration file.
T145	--	Idle Timeout option. An HP-proprietary tag to set the idle timeout (seconds), which is the amount of time that a print data connection may remain idle before being closed. The range is 1–3600 seconds.
T146	--	Buffer Packing option. An HP-proprietary tag to set buffer packing for TCP/IP packets. 0 (default): Normal data buffers are packed before sending to the printer. 1: Disable buffer packing. Data is sent to the printer when received.
T147	--	Write Mode option. An HP-proprietary tag that controls the TCP PSH flag setting for device-to-client data transfers. 0 (default): disables this option, flag not set. 1: all-push option. The push bit is set in all data packets.
T148	--	IP Gateway Disable option. An HP-proprietary tag to prevent configuration of a Gateway IP address. 0 (default): allows an IP address. 1: prevents a Gateway IP address to be configured.
T149	--	Interlock Mode option. An HP-proprietary tag that specifies whether an acknowledgement (ACK) on all TCP packets is required before the printer is allowed to close a Port 9100 print connection. A Port Number and Option value are specified, in the form: <*Port Number*> <*Option*> <*Port Number*>: For supported HP Jetdirect print servers, the Port Number is 1 (default). <*Option*>: Option value 0 (default) disables interlock, 1 enables. Example: 1 1 specifies <Port 1>, <interlock enabled>
T150	--	TFTP server's IP address option. An HP-proprietary tag to specify the TFTP server's IP address where the TFTP configuration file is located.
T151	--	Network Configuration option. An HP-proprietary tag to specify either “BOOTP-ONLY” or “DHCP-ONLY” requests be sent.

A colon (:) indicates the end of a field, and a backslash (\) indicates that the entry is continued on the next line. Spaces are not allowed between the characters on a line. Names, such as host names, must begin with a letter and can contain only letters, numbers, periods (for domain names only), or hyphens. The underline character (_) is not allowed. Refer to your system documentation or online help for more information.

TFTP Configuration File Entries (IPv4)

To provide additional configuration parameters for your HP Jetdirect print server, such as SNMP (Simple Network Management Protocol) or non-default settings, an additional configuration file can be downloaded using TFTP. This TFTP configuration file's relative path name is specified in the BOOTP reply using the `/etc/bootptab` file's T144 vendor-specific tag (or the “ef” standard

BOOTP tag) entry. An example of a TFTP configuration file is provided below (the symbol '#' denotes a remark and is not included in the file).

Example of an HP Jetdirect TFTP Configuration File	
# Allow subnet 192.168.10.0 access allow: 192.168.10.0 255.255.255.0 # # Disable Telnet telnet-config: 0 # # Enable the embedded Web server ews-config: 1 # # Detect SNMP unauthorized usage auth-trap: on # # Send traps to 192.168.10.1 trap-dest: 192.168.10.1 # # Specify the Set Community Name set-cmnty-name: 1homer2 # # End of File	The `allow` command enables subnet 192.168.10.0 with access to the printer. Up to 10 'allow' entries can be written through TFTP, Telnet or embedded Web server. Single IP addresses for a specific systems can also be specified. The `telnet-config` command disables Telnet. The `ews-config` command enables the embedded Web server. The `auth-trap` command enables sending of SNMP authentication traps. The `trap-dest` command specifies the system to send SNMP traps to. The `set-cmnt-name` command specifies the community name required in SNMP Set commands.

The table below describes TFTP command parameters for HP Jetdirect firmware version V.31.xx and later. (Optional commands for the same function are shown in parentheses).

Table 3-2 TFTP Configuration File Parameters

General
passwd: (or passwd-admin:) ■ A password (up to 16 alphanumeric characters) that allows administrators to control changes of HP Jetdirect print server configuration parameters through Telnet, HP Web Jetadmin, or embedded Web server. The password may be cleared by a cold reset.
sys-location: (or host-location:, location:) ■ Identifies the physical location of the printer (SNMP sysLocation object). Only printable ASCII characters are allowed. The maximum length is 64 characters. The default location is undefined. (Example: `1st floor, south wall`)
sys-contact: (or host-contact:, contact:) ■ ASCII character string (up to 64 characters) that identifies the person who administers or services the printer (SNMP sysContact object). This may include how to contact this person. The default contact is undefined.

Table 3-2 TFTP Configuration File Parameters (continued)

ssl-state: (or ssl-redirect-config)

- Sets the print server's security level for Web communications:

  1: Forced redirection to the HTTPS port. Only HTTPS (secure HTTP) communications can be used.

  2: Disable forced redirection to HTTPS. Both HTTP and HTTPS communications can be used.

security-reset:

- Reset security settings on the print server to factory default values. 0 (default) does not reset, 1 resets the security settings.

TCP/IP Main

host-name: (or sys-name:, name:)

- Specifies the node name that will appear on the Jetdirect configuration page. Default is NPIxxxxxx, where xxxxxx is the last six digits of the LAN hardware address.

parm-file:

- Specifies the path and file name whose contents are sent to the printer for printing each time the print server is powered on. The path and filename entry is limited to 64 alphanumeric characters.

domain-name:

- The domain name for the device (for example, support.hp.com). It does not include the host name; it is not the Fully Qualified Domain Name (such as printer1.support.hp.com).

pri-dns-svr: (or dns-srv:)

- The IP address of the DNS (Domain Name System) server.

sec-dns-svr:

- The IP address of a secondary DNS server to use if the primary DNS server is unavailable.

pri-wins-svr: (or pri-wins-srv:)

- The IP address of the primary Windows Internet Naming Service (WINS) server.

sec-wins-svr: (or sec-wins-srv:)

- The IP address of the secondary Windows Internet Naming Service (WINS) server.

smtp-svr:

- The IP address of the outgoing e-mail Simple Mail Transport Protocol (SMTP) server, for use with supported Scan devices.

TCP/IP Print Options

9100-printing: (or 9100-config:)

- Enables or disables printing to TCP port 9100 on the print server. 0 disables, 1 (default) enables.

Table 3-2 TFTP Configuration File Parameters (continued)

ftp-printing: (or ftp-config:, ftp:)

- Enables or disables the ability to print through FTP: 0 disables, 1 (default) enables.

ipp-printing: (or ipp-config:, ipp:)

- Enables or disables the ability to print through IPP: 0 disables, 1 (default) enables.

lpd-printing: (or lpd-config:, lpd:)

- Enables or disables LPD (Line Printer Daemon) printing services on the Jetdirect print server. 0 disables, 1 (default) enables.

banner:

- A port-specific parameter that specifies printing an LPD banner page. 0 disables banner pages. 1 (default) enables banner pages.

interlock: (or interlock-mode:)

- Specifies whether an acknowledgement (ACK) on all TCP packets is required before the printer is allowed to close a Port 9100 print connection. A Port Number and Option value are specified. For current HP Jetdirect print servers, the Port Number is 1. Option value 0 (default) disables interlock, 1 enables. For example, “interlock 1 1” specifies Port 1, interlock enabled.

buffer-packing: (or packing:)

- Enables or disables buffer packing for TCP/IP packets.

  0 (default): is normal, the data buffer is packed before sending to the printer.

  1: disables buffer packing, data is sent to the printer as it is received.

write-mode:

- Controls the setting of the TCP PSH flag for device-to-client data transfers.

  0 (default): disables this option, flag is not set.

  1: all-push option. The push bit is set in all data packets.

mult-tcp-conn:

- Enables or disables multiple TCP connections.

  0 (default): allows multiple connections.

  1: disables multiple connections.

TCP/IP Raw Print Ports

raw-port: (or addrawport:)

- Specifies additional ports for printing to TCP port 9100. Valid ports are 3000 to 9000, which are application-dependent.

TCP/IP Access Control

allow: netnum [mask]

- Makes an entry into the host access list stored on the HP Jetdirect print server. Each entry specifies a host or network of hosts that are allowed to connect to the printer. The format is “allow: netnum [mask]” where netnum is a network

Table 3-2 TFTP Configuration File Parameters (continued)

number or host IP address, and mask is an address mask of bits applied to the network number and host address to verify access. Up to 10 access list entries are allowed. If there are no entries, all hosts are permitted access. For example, allow: 192.0.0.0 255.0.0.0 allows hosts on network 192. allow: 192.168.1.2 allows a single host. In this case, the default mask 255.255.255.255 is assumed and is not required. allow: 0 This entry clears the host access list. For additional information, see Security Features.
TCP/IP Other Settings
syslog-config: ■ Enables or disables syslog server operation on the print server: 0 disables, 1 (default) enables.
syslog-svr: (or syslog-srv:) ■ The syslog server's IP address. It specifies the server that the HP Jetdirect print server sends syslog messages to.
syslog-max: ■ Specifies the maximum number of syslog messages that can be sent by the HP Jetdirect print server on a per-minute basis. This setting allows administrators to control the log file size. The default is 10 per minute. If it's set to zero, the number of syslog messages is not restricted.
syslog-priority: ■ Controls the filtering of syslog messages sent to the syslog server. The filter range is 0 to 8, with 0 being the most specific and 8 the most general. Only messages that are lower than the filter level specified (or higher in priority) are reported. The default is 8, messages of all priorities are sent. If 0, all syslog messages are disabled.
syslog-facility: ■ A code used to identify the source facility of a message (for example, to identify the source of selected messages during troubleshooting). By default, the HP Jetdirect print server uses LPR as the source facility code, but local user values of local0 through local7 can be used to isolate individual or groups of print servers.
slp-config: ■ Enables or disables the Service Location Protocol (SLP) operation on the print server: 0 disables, 1 (default) enables.
slp-keep-alive: ■ Specifies a time period for the print server to send multicast packets on the network to prevent being deleted from network device tables. Some infrastructure devices, such as switches, may delete active devices from their device tables due to inactivity on the network. To enable this feature, set a value from 1 to 1440 minutes. Set 0 to disable this feature.
ttl-slp: ■ Specifies the IP multicast “Time To Live” (TTL) setting for Service Location Protocol (SLP) packets. The default value is 4 hops (the number of routers from the local network). The range is 1–15. When set to a -1, multicast capability is disabled.

Table 3-2 TFTP Configuration File Parameters (continued)

mdns-config:

- Enables or disables Multicast Domain Name System (mDNS) services. 0 disables, 1 (default) enables. mDNS is typically used on small networks for IP address and name resolution (through UDP port 5353) where a conventional DNS server is neither used or available.

mdns-service-name:

- Specifies an alphanumeric string of up to 64 ASCII characters assigned to this device or service. This name is persistent and is used to resolve a particular device or service if socket information (such as the IP address) changes from session to session. Apple mDNS will display this service. The default service name is the printer model and the LAN Hardware (MAC) address.

mdns-pri-svc:

- Specifies the mDNS highest priority service to use for printing.To set this parameter, choose one of the following printing option numbers:

  1: Port 9100 printing

  2: IPP port printing

  3: The default LPD raw queue

  4: The default LPD text queue

  5: The default LPD auto queue

  6: The default LPD binps (binary postscript) queue

  7 through **12**: If user-specified LPD queues are defined, corresponds to user-specified LPD queues 5 through 10.

  The default selection will depend on the printer, typically port 9100 printing or LPD binps.

ipv4-multicast:

- Enables or disables the receipt and transmission of IP version 4 multicast packets by the print server. 0 disables, 1 (default) enables.

NOTE If this parameter is disabled, other protocols that use multicast protocols, such as mDNS and SLP, may also be disabled without notification.

idle-timeout:

- The number of seconds that an idle print data connection is allowed to remain open. Since the card supports only a single TCP connection, the idle timeout balances the opportunity of a host to recover or complete a print job against the ability of other hosts to access the printer. The acceptable values range from 0 to 3600 (1 hour). If “0” is typed, the timeout mechanism is disabled. The default is 270 seconds.

user-timeout: (or telnet-timeout:)

- An integer (1..3600) that specifies the number of seconds that your Telnet or FTP session can be idle before it will be automatically disconnected. The default is 900 seconds. 0 disables the timeout.

CAUTION Small values, such as 1–5, may effectively disable the use of Telnet. A Telnet session may terminate before any changes can be made.

ews-config: (or web:)

- Enables or disables the print server's embedded Web server to change configuration values: 0 disables, 1 (default) enables.

Table 3-2 TFTP Configuration File Parameters (continued)

tcp-mss: (or subnets-local:)

- Specifies the maximum segment size (MSS) that the HP Jetdirect print server will advertise for use when communicating with local subnets (Ethernet MSS=1460 bytes or more) or remote subnets (MSS=536 bytes):

  0 (default): All networks are assumed to be local (Ethernet MSS=1460 bytes or more).

  1: Use MSS=1460 bytes (or more) for subnets, and MSS=536 bytes for remote networks.

  2: All networks are assumed to be remote (MSS=536 bytes), except the local subnet.

  MSS affects performance by helping to prevent IP fragmentation that may result in data retransmission.

tcp-msl:

- Specifies the maximum segment life (MSL) in seconds. The range is 5–120 seconds. The default is 15 seconds.

telnet-config: (or telnet:)

- If set to 0, this parameter instructs the print server not to allow incoming Telnet connections. To regain access, change the setting in the TFTP configuration file and power cycle the print server, or cold reset the print server to factory default values. If this parameter is set to 1, incoming Telnet connections are allowed.

default-ip:

- Specifies the IP address to use when the print server is unable to obtain an IP address from the network during a forced TCP/IP reconfiguration (for example, when powered off/on or manually configured to use BOOTP/DHCP).

  DEFAULT_IP: sets the legacy default IP address 192.0.0.192.

  AUTO_IP: sets a link-local IP address 169.254.x.x.

  The initial setting is determined by the IP address obtained when first powered on.

default-ip-dhcp:

- Specifies whether DHCP requests will be periodically transmitted when a legacy default IP address 192.0.0.192 or link-local IP address 169.254.x.x has been automatically assigned.

  0: Disables DHCP requests.

  1 (default): Enables DHCP requests.

dhcp-arbitration:

- Specifies the amount of time, in seconds, that the print server will wait for DHCP configuration offers. A value from 1 to 10 may be set. The default is 5 seconds.

phone-home-config:

- Specifies privacy settings on the print server during embedded Web server access. This command controls whether statistical data on product use may be sent to HP. For HP to collect data, Internet access is required.

  2: Prompt the user to allow sending data on initial access to the Networking tab of the embedded Web server. This is the factory-default and cold-reset value. Once changed, this value cannot be re-selected.

  1: Allows the sending of data to HP without prompting the user.

  0: Disables sending data to HP without prompting the user.

web-refresh:

- Specifies the time interval (1–99999 seconds) for embedded Web server diagnostic page updates. If set to 0, the refresh rate is disabled.

Table 3-2 TFTP Configuration File Parameters (continued)

SNMP
snmp-config: ■ Enables or disables SNMP operation on the print server. **0** disables, **1** (default) enables SNMP. **CAUTION** Disabling SNMP will disable all SNMP agents (SNMP v1, v2, v3) as well as communications with HP Web Jetadmin. In addition, firmware upgrades through current HP downloading utilities will be disabled.
get-cmnty-name: (or get-community-name:) ■ Specifies a password that determines which SNMP GetRequests the HP Jetdirect print server will respond to. This is optional. If a user-specified get community name is set, the print server will respond to either a user-specified community name or the factory-default. The community name must be ASCII characters. The maximum length is 255 characters.
set-cmnty-name: (or set-community-name:) ■ Specifies a password that determines which SNMP SetRequests (control functions) the HP Jetdirect print server will respond to. The community name of an incoming SNMP SetRequest must match the print server's "set community name" for the print server to respond. (For additional security, you may limit configuration access through the print server's host access list). Community names must be ASCII characters. The maximum length is 255 characters.
auth-trap: (or authentication-trap:) ■ Configures the print server to send (on) or not send (off) SNMP authentication traps. Authentication traps indicate that an SNMP request was received, but the community name check failed. The default is "on."
trap-dest: (or trap-destination:) ■ Enters a host's IP address into the HP Jetdirect print server's SNMP trap destination list. The command format is: trap-dest: *ip-address* [community name] [port number] The default community name is "public"; the default SNMP port number is "162". The port number cannot be specified without a community name. If a "trap-community-name" command is followed by "trap-dest" commands, the trap community name will be assigned to those entries unless a different community name is specified in each "trap-dest" command. To delete the table, use "trap-dest: 0". If the list is empty, the print server does not send SNMP traps. The list may contain up to three entries. The default SNMP Trap Destination List is empty. To receive SNMP traps, the systems listed on the SNMP trap destination list must have a trap daemon to listen to those traps.
IPX/SPX
ipx-config: (or ipx/spx:) ■ Enables or disables IPX/SPX protocol operation on the print server: 0 disables, 1 (default) enables.
ipx-unit-name: ■ A user-assigned alphanumeric name assigned to the print server (31 characters maximum). By default, the name will be NPIxxxxxx, where xxxxxx are the last six digits of the LAN hardware address.
ipx-frametype: ■ Specify the IPX frame type setting available for your print server model: AUTO (default), EN_SNAP, EN_8022, EN_8023, EN_II.

Table 3-2 TFTP Configuration File Parameters (continued)

ipx-sapinterval:

- Specifies the time interval (1 to 3600 seconds) that the HP Jetdirect print server waits between Service Advertising Protocol (SAP) broadcasts on the network. The default is 60 seconds. 0 disables SAP broadcasts.

ipx-nds-tree:

- Identifies the name of the Novell Directory Services (NDS) tree for this printer.

ipx-nds-context:

- An alphanumeric string, up to 256 characters, that specifies the NDS context for the HP Jetdirect print server.

ipx-job-poll:

- Specifies the time interval (seconds) that the HP Jetdirect print server will wait to check for print jobs in a print queue.

pjl-banner: (or ipx-banner:)

- Enables or disables printing an IPX banner page. 0 disables banner pages. 1 (default) enables banner pages.

pjl-eoj: (or ipx-eoj:)

- Enables or disables IPX end-of-job notification. 0 disables, 1 (default) enables.

pjl-toner-low: (or ipx-toner-low:)

- Enables or disables IPX toner-low notification. 0 disables, 1 (default) enables.

AppleTalk

appletalk: (or at-config:, ethertalk:)

- Enables or disables AppleTalk (EtherTalk) protocol operation on the print server: 0 disables, 1 (default) enables.

DLC/LLC

dlc/llc-config: (or dlc/llc:)

- Enables or disables DLC/LLC protocol operation on the print server: 0 disables, 1 (default) enables.

Other Settings

link-type:

- (For wired 10/100/1000T Ethernet) Sets the print server's link speed (10, 100, 1000 Mbps) and communication mode (Full- or Half-Duplex). The available link-speed selections depend on the print server model. Selections are AUTO, 1000FULL, 100AUTO, 100FULL, 100HALF, 10FULL, 10HALF.

  For AUTO (default), the print server uses auto-negotiation to configure itself with the highest link speed and communication mode allowed. If auto-negotiation fails, either 100TX HALF or 10TX HALF is set depending on the detected link speed of the hub/switch port. (A 1000T half-duplex selection is not supported.)

upgrade:

- To configure one or more Jetdirect print servers with the name and location of a firmware upgrade file.

Table 3-2 TFTP Configuration File Parameters (continued)

CAUTION Ensure that command parameters are properly entered and that the upgrade file is a higher version than the currently installed version. The print server will attempt to upgrade when the upgrade file contains a higher version than the installed version.

The command format is:

`upgrade: <TFTP server IP> <Version> <Product Number> <Filename>`

where,

`<TFTP Server IP>` is the IP address of the TFTP server,

`<Version>` specifies the firmware version of the upgrade file,

`<Product Number>` specifies and must match the product number of the print server,

`<Filename>` is the path and filename of the firmware upgrade file.

status-page-lang:

- Specifies the page description language (PDL) that the print server will use to send the Jetdirect configuration/status page to the printer.
  - Auto (default): The PDL is auto-detected when the print server is powered on or after a cold-reset.
  - PCL: Hewlett-Packard Printer Control Language
  - ASCII: Standard ascii characters
  - HPGL2: Hewlett-Packard Graphics Language (v2)
  - PS: Postscript language

Support

support-name: (or support-contact:)

- Typically used to identify the name of a person to contact for support of this device.

support-number:

- Typically used to specify a phone number or extension to call for support of this device.

support-url:

- A Web URL for product information on this device over the Internet or an intranet.

tech-support-url:

- A Web URL for technical support over the Internet or an intranet.

Using DHCP (IPv4)

Dynamic Host Configuration Protocol (DHCP, RFC 2131/2132) is one of several auto configuration mechanisms that the HP Jetdirect print server uses. If you have a DHCP server on your network, the HP Jetdirect print server automatically obtains its IP address from that server and registers its name with any RFC 1001 and 1002-compliant dynamic name services as long as a WINS (Windows Internet Naming Service) server IP address has been specified.

A TFTP (Trivial File Transfer Protocol) configuration file may also be used with DHCP to configure extended parameters. For more information on TFTP parameters, see “Using BOOTP/TFTP (IPv4)”.

NOTE DHCP services must be available on the server. Refer to your system documentation or online help to install or enable DHCP services.

NOTE If the Jetdirect print server and BOOTP/DHCP server are located on different subnets, IP configuration may fail unless the routing device allows the transfer of DHCP requests between subnets.

UNIX Systems

For more information on setting up DHCP on UNIX systems, see the bootpd man page.

On HP-UX systems, a sample DHCP configuration file (dhcptab) may be located in the `/etc` directory.

Since HP-UX presently does not provide Dynamic Domain Name Services (DDNS) for its DHCP implementations, HP recommends that you set all print server lease durations to “infinite”. This ensures that print server IP addresses remain static until dynamic domain name services are provided.

Windows Systems

HP Jetdirect print servers support IP configuration from a supported Windows DHCP server. This section describes how to set up a pool, or “scope,” of IP addresses that the Windows server can assign or lease to any requester. When configured for BOOTP or DHCP operation and powered on, the HP Jetdirect print server automatically sends a BOOTP or DHCP request for its IP configuration. If properly set up, a Windows DHCP server will respond with the print server's IP configuration data.

NOTE This information is provided as an overview. For specific information or for additional support, see the information supplied with your DHCP server software.

NOTE To avoid problems resulting from IP addresses that change, HP recommends that all printers be assigned IP addresses with infinite leases or reserved IP addresses.

Windows NT 4.0 Server

To set up a DHCP scope on a Windows NT 4.0 server, perform the following steps:

1. At the Windows NT server, open the **Program Manager** window and double-click the **Network Administrator** icon.
2. Double-click the **DHCP Manager** icon to open this window.
3. Select **Server** and select **Server Add**.
4. Type the server IP address, then click **OK** to return to the **DHCP Manager** window.
5. In the list of DHCP servers, click on the server you have just added, then select **Scope** and select **Create**.
6. Select **Set up the IP Address Pool**. In the **IP Address Pool** section, set up the IP address range by typing the beginning IP address in the **Start Address** box and the ending IP address in the **End Address** box. Also type the subnet mask for the subnet to which the IP address pool applies.

The starting and ending IP addresses define the end points of the address pool assigned to this scope.

NOTE If desired, you can exclude ranges of IP addresses within a scope.

7 In the **Lease Duration** section, select **Unlimited**, then select **OK**.

HP recommends that all printers be assigned infinite leases to avoid problems resulting from IP addresses that change. Be aware, however, that selecting an unlimited lease duration for the scope causes all clients in that scope to have infinite leases.

If you want clients on your network to have finite leases, you can set the duration to a finite time, but you should configure all printers as reserved clients for the scope.

8 Skip this step if you have assigned unlimited leases in the previous step. Otherwise, select **Scope** and select **Add Reservations** to set up your printers as reserved clients. For each printer, perform the following steps in the **Add Reserved Clients** window to set up a reservation for that printer:

- Type the selected IP address.
- Obtain the MAC address or hardware address from the configuration page, and type this address in the **Unique Identifier** box.
- Type the client name (any name is acceptable).
- Select **Add** to add the reserved client. To delete a reservation, in the **DHCP Manager** window, select **Scope** and select **Active Leases**. In the **Active Leases** window, click on the reservation you want to delete and select **Delete**.

9 Select **Close** to return to the **DHCP Manager** window.

10 Skip this step if you are not planning to use WINS (Windows Internet Naming Service). Otherwise perform the following steps when configuring your DHCP server:

- From the **DHCP Manager** window, select **DHCP Options** and select one of the following:

  Scope—if you want Name Services only for the selected scope.

  Global—if you want Name Services for all scopes.

- Add the server to the **Active Options** list. From the **DHCP Options** window, select **WINS/ NBNS Servers (044)** from the **Unused Options** list. Select **Add**, then select **OK**.

  A warning may appear requesting that you set the node type. You do this in step 10d.

- You must now provide the IP address of the WINS server by doing the following:
  - Select **Value**, then **Edit Array**.
  - From the IP Address Array Editor, select **Remove** to delete any undesired addresses previously set. Then type in the IP address of the WINS server and select **Add**.
  - Once the address appears in the list of IP addresses, select **OK**. This returns you to the **DHCP Options** window. If the address you have just added appears in the list of IP addresses (near the bottom of the window) return to step 10d. Otherwise, repeat step 10c.

- In the **DHCP Options** window, select **WINS/NBT Node Type (046)** from the **Unused Options** list. Select **Add** to add the node type to the **Active Options** list. In the **Byte** box, type `0x4` to indicate a mixed node, and select **OK**.

11 Click **Close** to exit to **Program Manager**.

Windows 2000 Server/Server 2003

To set up a DHCP scope on a Windows 2000 server or Server 2003 system, perform the following steps:

1 Run the Windows DHCP manager utility.

- Windows 2000: Click **Start**, then select **Settings** and **Control Panel**. Open the **Administrative Tools** folder and run the **DHCP** utility.
- Server 2003: Click **Start**, then select **Control Panel**. Open the **Administrative Tools** folder and run the **DHCP** utility.

2 In the **DHCP** window, locate and select your Windows server in the DHCP tree.

If your server is not listed in the tree, select **DHCP** and click the **Action** menu to add the server.

3 After selecting your server in the DHCP tree, click the **Action** menu and select **New Scope**. This runs the **Add New Scope** Wizard.

4 In the **Add New Scope** Wizard, click **Next**.

5 Enter a Name and Description for this scope, then click **Next**.

6 Enter the range of IP addresses for this scope (beginning IP address and ending IP address). Also, enter the subnet mask. then click **Next**.

NOTE If subnetting is used, the subnet mask defines which portion of an IP address specifies the subnet and which portion specifies the client device.

7 If applicable, enter the range of IP addresses within the scope to be excluded by the server. Then click **Next**.

8 Set the IP address lease duration for your DHCP clients. Then click **Next**.

HP recommends that all printers be assigned reserved IP addresses. This can be accomplished after you set up the scope (see step 11).

9 Select **No** to configure DHCP options for this scope later. Then click **Next**.

To configure DHCP options now, select **Yes** and click **Next**.

- If desired, specify the IP address of the router (or default gateway) to be used by clients. Then click **Next**.
- If desired, specify the Domain Name and DNS (Domain Name System) servers for clients. Click **Next**.
- If desired, specify WINS server names and IP addresses. Click **Next**.
- Select **Yes** to activate the DHCP options now, and click **Next**.

10 You have successfully set up the DHCP scope on this server. Click **Finish** to close the wizard.

11 Configure your printer with a reserved IP address within the DHCP scope:

- In the DHCP tree, open the folder for your scope and select **Reservations**.
- Click the **Action** menu and select **New Reservation**.
- Enter the appropriate information in each field, including the reserved IP address for your printer. (Note: the MAC address for your HP Jetdirect-connected printer is available on the HP Jetdirect configuration page.)
- Under “Supported types”, select **DHCP only**, then click **Add**. (Note: Selecting **Both** or **BOOTP only** will result in a configuration through BOOTP due to the sequence in which HP Jetdirect print servers initiate configuration protocol requests.)
- Specify another reserved client, or click **Close**. The reserved clients added will be displayed in the Reservations folder for this scope.

12 Close the DHCP manager utility.

To Discontinue DHCP Configuration

CAUTION Changes to an IP address on your HP Jetdirect print server may require updates to printer or system printing configurations for clients or servers.

If you do not want your HP Jetdirect print server configured through DHCP, you must re-configure the print server to use a different configuration method.

1 (For internal print servers) If you use the printer control panel to set Manual or BOOTP configuration, then DHCP will not be used.

2 You can use Telnet to set Manual (status indicates “User Specified”) or BOOTP configuration, then DHCP will not be used.

3 You can manually modify the TCP/IP parameters through a supported Web browser using the Jetdirect embedded Web server or HP Web Jetadmin.

If you change to BOOTP configuration, the DHCP-configured parameters are released and the TCP/IP protocol is initialized.

If you change to Manual configuration, the DHCP-configured IP address is released and the user-specified IP parameters are used. **Therefore, if you manually provide the IP address, you should also manually set all of the configuration parameters, such as subnet mask, default gateway, and idle timeout**.

NOTE If you choose to re-enable a DHCP configuration, the print server will acquire its configuration information from a DHCP server. This means that when you choose DHCP and complete your configuration session (using Telnet, for example), the TCP/IP protocol for the print server is re-initialized and all current configuration information is deleted. The print server then attempts to acquire new configuration information by sending DHCP requests on the network to a DHCP server.

For DHCP configuration through Telnet, refer to “Using Telnet (IPv4)” in this chapter.

Using RARP (IPv4)

This section describes how to configure the print server using the Reverse Address Resolution Protocol (RARP) on UNIX and Linux systems.

This setup procedure enables the RARP daemon running on your system to respond to a RARP request from the HP Jetdirect print server and to supply the IP address to the print server.

1. Turn the printer off.
2. Log onto your UNIX or Linux system as a superuser.
3. Make sure the RARP daemon is running on your system by typing the following command at the system prompt:

   `ps -ef | grep rarpd` (Unix)

   `ps ax | grep rarpd` (BSD or Linux)
4. The system response should be similar to the following:

   ```
   861 0.00.2 24 72 5 14:03 0:00 rarpd -a

   860 0.00.5 36 140 5 14:03 0:00 rarpd -a
   ```
5. If the system does not display a process number for the RARP daemon, see the *rarpd* man page for instructions on starting the RARP daemon.
6. Edit the `/etc/hosts` file to add your designated IP address and node name for the HP Jetdirect print server. For example:

   ```
   192.168.45.39 laserjet1
   ```
7. Edit the `/etc/ethers` file (`/etc/rarpd.conf` file in HP-UX 10.20) to add the LAN hardware address/station address (from the configuration page) and the node name for the HP Jetdirect print server. For example:

   ```
   00:01:E6:a8:b0:00 laserjet1
   ```

   NOTE If your system uses Network Information Service (NIS), you need to incorporate changes to the NIS host and ethers databases.
8. Turn the printer on.
9. To verify that the card is configured with the correct IP address, use the ping utility. At the prompt, type:

   `ping <IP address>`

   where `<IP address>` is the assigned address from RARP.
10. If ping does not respond, see Troubleshooting the HP Jetdirect Print Server.

Using the arp and ping Commands (IPv4)

You can configure an HP Jetdirect print server with an IP address using an ARP (Address Resolution Protocol) command from a supported system. The protocol is not routable, that is, the workstation

from which the configuration is made must be located on the same network segment as the HP Jetdirect print server.

Using the arp and ping commands with HP Jetdirect print servers requires the following:

- Windows NT/2000/XP/Server 2003 or UNIX system configured for TCP/IP operation
- A legacy default IP address 192.0.0.192 has been set on the print server
- The LAN hardware (MAC) address of the HP Jetdirect print server (specified on an HP Jetdirect configuration page

NOTE On some systems, superuser rights may be required for the `arp` command.

After an IP address is assigned through `arp` and `ping` commands, use other tools (such as Telnet, embedded Web server, or HP Web Jetadmin software) to configure other IP parameters.

To configure a Jetdirect print server, use the following commands:

```
arp -s <IP address> <LAN hardware address>

ping <IP address>
```

where `<IP address>` is the desired IP address to be assigned to the print server. The `arp` command writes the entries to the arp cache on the workstation, and the `ping` command configures the IP address on the print server.

Depending on the system, the LAN hardware address may require a specific format.

For example:

- For Windows NT 4.0, 2000, XP, Server 2003

  ```
  arp -s 192.168.45.39     00-01-E6-a2-31-98

  ping 192.168.45.39
  ```

- For UNIX

  ```
  arp -s 192.168.45.39     00:01:E6:a2:31:98

  ping 192.168.45.39
  ```

NOTE Once the IP address has been set on the print server, additional `arp` and `ping` commands will be ignored. Once the IP address is configured, `arp` and `ping` cannot be used unless the print server is reset to factory values (see Troubleshooting the HP Jetdirect Print Server).

On UNIX systems, the `arp -s` command may vary between different systems.

Some BSD-based systems expect the IP address (or host name) in reverse order. Other systems may require additional parameters. See your system documentation for specific command formats.

Using Telnet (IPv4)

This section describes how to configure the print server using Telnet.

Although a Telnet connection may be protected by an administrator password, Telnet connections are not secure. For networks with high security levels, Telnet connections can be disabled on the print server using other tools (for example, TFTP, embedded Web server, or HP Web Jetadmin software).

Creating a Telnet Connection

To use Telnet commands with the HP Jetdirect print server, a route must be available from your workstation to the print server. If the print server and your computer have a similar IP address, that is, the network portion of their IPv4 addresses match, chances are that a route will exist.

If their IPv4 addresses do not match, then you can either change your workstation's IPv4 address to match, or you can try an operating system command to create a route to the print server. (For example, if the print server is configured with a legacy default IP address 192.0.0.192, a route will not likely exist.)

On Windows systems, you can use the “route” command at a Windows command (DOS) prompt to create a route to the print server.

For information on system command prompts, see your Windows online help. On Windows NT systems, the command prompt utility is in the **Programs** folder (click **Start**, **Programs**, **Command Prompt**). On Windows 2000/XP/Server 2003 systems, it is in the **Accessories** folder in the **Programs** or **All Programs** folder.

To use the route command, you will also need the IPv4 address of your workstation. To view it, you can enter the appropriate command at the command prompt:

`C:\> ipconfig` (on Windows NT/2000/XP/Server 2003)

`C:\> winipconfig` (on Windows 98)

To create a route from the system command prompt, enter the following command:

```
route add <Jetdirect IP Address> <system IP Address>
```

where `<Jetdirect IP address>` is the IP address configured on the HP Jetdirect print server, and `<system IP address>` is the IP address of the workstation's network card that is attached to the same physical LAN as the print server.

For example, to create a route from your workstation with IP address 169.254.2.1 to a print server with a default IP address of 192.0.0.192, try this command:

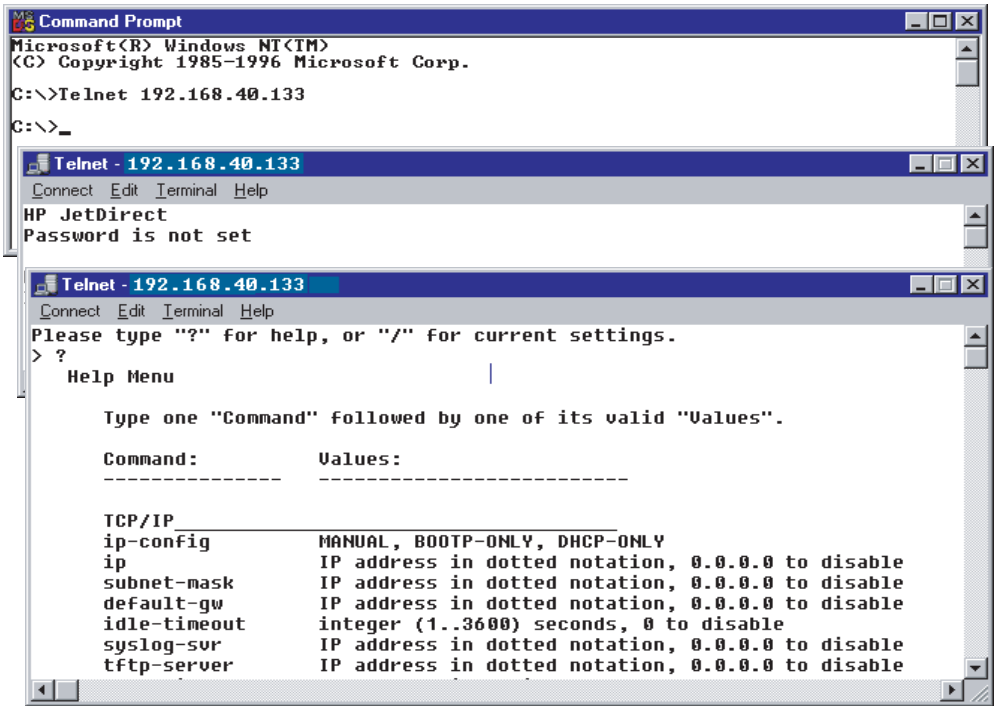
```
route add 192.0.0.192 169.254.2.1
```

CAUTION Using Telnet to manually set an IPv4 address will override dynamic IP configuration (such as BOOTP, DHCP, or RARP), resulting in a static configuration. In a static configuration, the IP values are fixed and the operation of BOOTP, DHCP, RARP and other dynamic configuration methods may no longer function.

Whenever you are manually changing an IP address, you should also reconfigure the subnet mask and default gateway at the same time.

A Typical Telnet Session

Initiating a typical Telnet session is illustrated below.



To set configuration parameters, you must set up a Telnet session from your system to the HP Jetdirect print server.

1 Type the following at the system prompt:

`telnet <IP address>`

where `<IP address>` is the IP address listed on the Jetdirect configuration page. See HP Jetdirect Configuration Pages.

2 A connection to the HP Jetdirect print server will be displayed. If the server responds with "**connected to IP address**", press Enter twice to make sure that the Telnet connection is initialized.

3 If prompted for a user name and password, enter the correct values.

By default, the Telnet interface does not require a user name or password. If an administrator password has been set, you will be prompted for a user name and this password before you can enter and save Telnet command settings.

4 By default, a Command Line interface is provided. To configure parameters using a Menu interface, enter **Menu**. For more information, see "User Interface Options".

For a list of supported commands and parameters, see Table 3-3 Telnet Commands and Parameters.

User Interface Options

The HP Jetdirect print server provides two interface options to enter Telnet commands: a Command Line Interface (Default) and a Menu Interface.

Command Line Interface (Default)

Using the Telnet command line interface, you can set configuration parameters using the following procedures:

NOTE During a Telnet session, enter ? to view available configuration parameters, the correct command format, and a list of commands.

To list additional (or advanced) commands, enter the command `advanced` before entering `?`.

To display current configuration information, enter `/`.

1 At the Telnet prompt ">" type:

`<parameter>: <value>`

then press Enter, where `<parameter>` refers to the configuration parameter you are defining, and `<value>` refers to the definitions you are assigning to that parameter. Each parameter entry is followed by a carriage return.

See Table 3-3 Telnet Commands and Parameters for configuration parameters.

2 Repeat the previous step to set any additional configuration parameters.

3 When you have finished typing the configuration parameters, type `exit` or `quit` (depending on your system).

When prompted whether to save settings that you have changed, enter `Y` (default) for Yes, or `N` for No.

If you enter `save` instead of `exit` or `quit`, you will not be prompted to save settings.

Telnet Commands and Parameters. Table 3-3 Telnet Commands and Parameters lists the available Telnet commands and parameters.

NOTE If a parameter is supplied dynamically (for example, from a BOOTP or DHCP server), its value cannot be changed using Telnet without first setting Manual configuration. To set Manual configuration, see the `ip-config` command.

Whenever you are manually changing an IP address, you should also reconfigure the subnet mask and default gateway at the same time.

Table 3-3 Telnet Commands and Parameters

Command	Description
User Control Commands	
?	Displays the Help and Telnet commands.
/	Displays current values.
menu	Displays the Menu Interface for access to configuration parameters.
advanced	Enables the Advanced commands. Help (?) will include the Advanced commands in the list.

Table 3-3 Telnet Commands and Parameters (continued)

general	Disables the Advanced commands. Help (?) will not include Advanced commands (default).
save	Save the configuration values and exit the session.
exit	Exit the session.
export	Export the settings to a file for editing, and importing through Telnet or TFTP (this command is only supported by systems, such as UNIX, that support input/output redirection).
General	
passwd	Set the administrator password (shared with the embedded Web server and HP Web Jetadmin). For example, “passwd jd1234 jd1234” sets the password to jd1234. Note that “jd1234” is entered twice for confirmation. Up to 16 alphanumeric characters may be used. When initiating the next Telnet session, you will be prompted for a user name and this password. To clear the password, enter the command without password and confirmation entries. Passwords may be cleared by a cold reset.
sys-location	Alpha-numeric string (up to 255 characters), typically used to identify a location.
sys-contact	Alpha-numeric string (up to 255 characters), typically used to identify the name of a network or device administrator.
ssl-state	Sets the print server's security level for Web communications: **1**: Forced redirection to the HTTPS port. Only HTTPS (secure HTTP) communications can be used. **2**: Disable forced redirection to HTTPS. Both HTTP and HTTPS communications can be used.
security-reset	Reset security settings on the print server to factory default values. 0 (default) does not reset, 1 resets the security settings.
TCP/IP Main	
host-name	Alphanumeric string (up to 32 characters), to assign or change the name of the network device. For example, “host-name printer1” assigns the name “printer1” to the device. The default host name is NPIxxxxxx, where xxxxxx are the last six digits of the LAN hardware (MAC) address.
ip-config	Specify the configuration method: **manual**: The print server will wait for IP parameters using manual tools (such as Telnet, embedded Web server, control panel, installation/management software). Status will be `User Specified`. **bootp**: The print server will send BOOTP requests on the network for dynamic IP configuration. **dhcp**: The print server will send DHCP requests on the network for dynamic IP configuration. **auto_ip**: The print server will be automatically configured with a unique link-local address 169.254.x.x.

Table 3-3 Telnet Commands and Parameters (continued)

ipsec-config	Use this command to disable IPsec, if it is enabled on the print server. IPsec cannot be enabled by this command; if IPsec is enabled, its status will be “read only”. 0: Disable IPsec, if it is enabled. 1: (Read Only) Indicates IPsec is enabled. Use the embedded Web server to enable IPsec.
ip	IP address for the print server, in dotted notation. For example: `ip-config manual ip 192.168.45.39` where `ip-config` specifies manual configuration and `ip` manually sets the IP address 192.168.45.39 on the print server. Specifying 0.0.0.0 clears the IP address. If you exit and save a new IP address, it must be specified on the next Telnet connection.
subnet-mask	A value (in dotted notation) that identifies the network and host portions of an IP address in received messages. For example, `subnet-mask 255.255.255.0` stores the subnet mask value 255.255.255.0 on the print server. The value 0.0.0.0 disables the subnet mask.
default-gw	The IP address of a default gateway, in dotted notation. For example, `default-gw 192.168.40.1` assigns 192.168.40.1 as the IP address of the default gateway for the print server. **NOTE** If the HP Jetdirect print server is configured by DHCP and you manually change the subnet mask or the default gateway address, you should manually change the print server's IP address. This will release the DHCP-assigned address back to the DHCP IP address pool.
Config Server	(Read-only parameter) The IP address of the server (such as a BOOTP or DHCP server) that last configured the IP address on the HP Jetdirect print server.
TFTP Server	(Read-only parameter) The IP address of the TFTP server that provided TFTP parameters to the HP Jetdirect print server.
TFTP Filename	(Read-only parameter) The path and TFTP filename on the TFTP server. For example, hpnp/printer1.cfg
domain-name	The domain name for the device. For example, `domain-name support.hp.com` assigns `support.hp.com` as the domain name. The domain name does not include the host name; it is not the Fully Qualified Domain Name (such as printer1.support.hp.com).
pri-dns-svr	IP address of the primary DNS (Domain Name System) server.
sec-dns-svr	IP address of a secondary DNS server to use if the primary DNS server is unavailable.
pri-wins-svr	The IP address of the primary Windows Internet Naming Service (WINS) server, in dotted notation.
sec-wins-svr	The IP address of the secondary Windows Internet Naming Service (WINS) server, in dotted notation.

Table 3-3 Telnet Commands and Parameters (continued)

TCP/IP Print Options	
9100-printing	Enables or disables printing to TCP port 9100 on the print server. **0** disables, **1** (default) enables.
ftp-printing	Enables or disables the ability to print through FTP. **0** disables, **1** (default) enables. (TCP ports 20, 21)
ipp-printing	Enables or disables the ability to print using IPP. **0** disables, **1** (default) enables. (TCP port 631)
lpd-printing	Enables or disables the ability to print using LPD. **0** disables, **1** (default) enables.(TCP port 515)
banner	Enables or disables printing an LPD banner page. **0** disables banner pages. **1** (default) enables banner pages.
ipp-job-acct	Enable or disable job accounting for IPP printing. **0** disables, **1** (default) enables.
interlock	Specifies whether an acknowledgement (ACK) on all TCP packets is required before the printer is allowed to close a Port 9100 print connection. A Port Number and Option value are specified. For HP embedded print servers, the default Port Number is 1. Option value **0** (default) disables interlock, **1** enables. For example, `"interlock 1 1"` specifies port 1, interlock enabled.
mult-tcp-conn	(Restrict Multiple Ports) Enables or disables multiple TCP connections. Allows you to restrict the use of multiple ports. **0** (default): allows multiple connections. **1**: disables multiple connections.
buffer-packing	Enables or disables buffer packing for TCP/IP packets. **1** (default): is normal, the data buffer is packed before sending to the printer. **0**: disables buffer packing, data is sent to the printer as it is received.
write-mode	Controls the setting of the TCP PSH flag for device-to-client data transfers. **0** (default): disables this option, flag is not set. **1**: all-push option. The push bit is set in all data packets.
TCP/IP LPD Queues	
addq	Adds a user-defined queue. The queue name (up to 32 displayable ASCII characters), prepend string name, append string name, and processing queue (typically, RAW) must be specified in the command line. Up to six user-defined queues may be added. **CAUTION** Avoid the differentiation of queue names through the use of lower- and upper-case characters only. Otherwise, management of LPD queues by other tools may yield unpredictable results.
deleteq	Delete a user-specified queue. The queue name must be specified in the deleteq command line.
defaultq	Name of the queue to be used if the queue specified for a print job is unknown. By default, the default queue is **AUTO**.
addstring	Adds a user-defined character string that may be prepended or appended to print data. Up to eight character strings may be specified. A string name and the character string contents are specified in the addstring command line.
deletestring	Deletes a user-defined string. The string name is specified in the deletestring command line.

Table 3-3 Telnet Commands and Parameters (continued)

TCP/IP Raw Print Ports	
raw-port	Specifies additional ports for printing to TCP port 9100. Valid ports are 3000 to 9000, which are application-dependent. Up to two ports can be specified.
TCP/IP Access Control	
allow	Makes an entry into the host access list stored on the HP Jetdirect print server. Each entry specifies a host or network of hosts that are allowed to connect to the printer. The format is “allow netnum [mask]” where netnum is a network number or host IP address, and mask is an address mask of bits applied to the network number and host address to verify access. Up to 10 access list entries are allowed. If there are no entries, all hosts are permitted access. For example, `allow 192.0.0.0 255.0.0.0` — allows hosts on network 192. `allow 192.168.1.2` — allows a single host. In this case, the default mask 255.255.255.255 is assumed and is not required. `allow 0` — clears the host access list. For additional information, see Security Features.
TCP/IP Other	
syslog-config	Enables or disables syslog server operation on the print server: **0** disables, **1** (default) enables. (UDP port 514)
syslog-svr	The syslog server's IP address in dotted notation. It specifies the server that the HP Jetdirect print server sends syslog messages to. For example, `syslog-svr: 192.168.40.1` assigns 192.168.40.1 as the IP address of that server.
syslog-max	Specifies the maximum number of syslog messages that can be sent by the HP Jetdirect print server on a per-minute basis. This setting allows administrators to control the log file size. The default is 10 per minute. If it's set to zero, the number of syslog messages is not restricted.
syslog-priority	Controls the filtering of syslog messages sent to the syslog server. The filter range is **0** to **8**, with **0** being the most specific and **8** the most general. Only messages that are lower than the filter level specified (or higher in priority) are reported. The default setting is **8**, where messages of all priorities are sent. If **0**, all syslog messages are disabled.
syslog-facility	A code used to identify the source facility of a message (for example, to identify the source of selected messages during troubleshooting). By default, the HP Jetdirect print server uses **LPR** as the source facility code, but local user values of **local0** through **local7** can be used to isolate individual or groups of print servers.
slp-config	Enables or disables the Service Location Protocol (SLP) operation on the print server: **0** disables, **1** (default) enables. SLP is used by selected HP software applications (through UDP port 427) to automate device discovery. If SLP will use multicast protocols, Multicast IPv4 must be enabled.
slp-keep-alive	Specifies a time period for the print server to send multicast packets on the network to prevent being deleted from network device tables. Some infrastructure devices, such as switches, may delete active devices from their device tables due to inactivity on the

Table 3-3 Telnet Commands and Parameters (continued)

	network. To enable this feature, set a value from 1 to 1440 minutes. Set 0 to disable this feature.
mdns-config	Enables or disables Multicast Domain Name System (mDNS) services. **0** disables, **1** (default) enables. mDNS is typically used on small networks for IP address and name resolution (through UDP port 5353) where a conventional DNS server is not available. For mDNS operation, Multicast IPv4 must be enabled.
mdns-service-name	Specifies an alphanumeric string of up to 64 ASCII characters assigned to this device or service. This name is persistent and is used to resolve a particular device or service if socket information (such as the IP address) changes from session to session. Apple mDNS will display this service. The default service name is the printer model and the LAN Hardware (MAC) address.
mDNS Domain Name	(Read-only parameter) Specifies the mDNS domain name assigned to the device, in the form <host name>.local. If a user-specified host name has not been assigned, the default host name NPIxxxxxx is used, where xxxxxx are the last 6 digits of the LAN hardware (MAC) address.
mdns-pri-svc	Specifies the mDNS highest priority service to use for printing.To set this parameter, choose one of the following printing option numbers: **1**: Port 9100 printing **2**: IPP port printing **3**: The default LPD raw queue **4**: The default LPD text queue **5**: The default LPD auto queue **6**: The default LPD binps (binary postscript) queue **7** through **12**: If user-specified LPD queues are defined, corresponds to user-specified LPD queues 5 through 10. The default selection will depend on the printer, typically port 9100 printing or LPD binps.
ttl-slp	Specifies the IP multicast “Time To Live” (TTL) setting for Service Location Protocol (SLP) packets. The default value is 4 hops (the number of routers from the local network). The range is 1–15. When set to a -1, multicast capability is disabled.
ipv4-multicast	Enables or disables the receipt and transmission of IP version 4 multicast packets by the print server. **0** disables, **1** (default) enables. **NOTE** If this parameter is disabled, other protocols that use multicast protocols, such as mDNS and SLP, may also be disabled without notification.
idle-timeout	An integer (1to 3600) that specifies the number of seconds an idle print data connection is allowed to remain open. For example, `idle-timeout 120` assigns 120 seconds as the desired idle timeout value. The default is 270 seconds. If set to 0, the connection will not terminate and other hosts will not be able to make a connection.

Table 3-3 Telnet Commands and Parameters (continued)

user-timeout	An integer (1to 3600) that specifies the number of seconds that your Telnet or FTP session can be idle before it will be automatically disconnected. The default is 900 seconds. 0 disables the timeout. **CAUTION** Small values, such as 1–5, may effectively disable the use of Telnet. A Telnet session may terminate before any changes can be made.
cold-reset	**1**: Sets TCP/IP factory default settings. After a cold reset, power cycle the print server. Parameters for other subsystems, such as IPX/SPX or AppleTalk, are not affected. **0**: Normal operation, and reset is disabled.
ews-config	Enables or disables the print server's embedded Web server. **0** disables, **1** (default) enables. For more information, see HP Jetdirect Embedded Web Server (V.31.xx).
web-refresh	Specifies the time interval (1–99999 seconds) for embedded Web server diagnostic page updates. If set to 0, the refresh rate is disabled.
tcp-mss	Specifies the maximum segment size (MSS) that the HP Jetdirect print server will advertise for use when communicating with local subnets (Ethernet MSS=1460 bytes or more) or remote subnets (MSS=536 bytes): **0**: (default) All networks are assumed to be local (Ethernet MSS=1460 bytes or more). **1**: Use MSS=1460 bytes (or more) for subnets, and MSS=536 bytes for remote networks. **2**: All networks are assumed to be remote (MSS=536 bytes), except the local subnet. MSS affects performance by helping to prevent IP Fragmentation that may result in data retransmission.
tcp-msl	Specifies the maximum segment life (MSL) in seconds. The range is 5–120 seconds. The default is 15 seconds.
gw-disable	Specifies whether or not to automatically assign the device IP address as the gateway when a network gateway is not configured. **0**: A gateway using the device IP address will be assigned. **1**: A gateway is not assigned. The gateway address 0.0.0.0 will be configured.
default-ip	Specifies the IP address to use when the print server is unable to obtain an IP address from the network during a forced TCP/IP reconfiguration (for example, when powered off/on or manually configured to use BOOTP/DHCP). **DEFAULT_IP**: sets the legacy default IP address 192.0.0.192. **AUTO_IP**: sets a link-local IP address 169.254.x.x. The initial setting is determined by the IP address obtained when first powered on.
default-ip-dhcp	Specifies whether DHCP requests will be periodically transmitted when a legacy default IP address 192.0.0.192 or link-local IP address 169.254.x.x has been automatically assigned. **0**: Disables DHCP requests. **1** (default): Enables DHCP requests.

Table 3-3 Telnet Commands and Parameters (continued)

dhcp-fqdn-config (dhcp-fqdn-behavior)	Specifies configuration control of the Fully Qualified Domain Name (FQDN), using either DHCP, manual configuration, or both. The fully qualified domain name consists of the device's host name and domain name. Select one of the following command values: **0** (default): DHCP may be used to supply the host name and domain name. The host name may be changed using a manual configuration method (such as the embedded Web server, printer control panel, or Telnet). However, the domain name cannot be manually changed if it was configured through DHCP. **1**: Keep DHCP settings only. Once the Fully Qualified Domain Name is configured through DHCP, manual changes cannot be made. **2**: Keep manual settings. The settings can be manually configured. DHCP may be used only if the settings are factory-default values. **3**: Keep manual settings only. While manual configuration methods may be used, configuration through DHCP is not allowed.
duid	Specifies the DHCP Unique Identifier for a client, using a hexadecimal string to represent up to 260 characters.
dns-cache-ttl	The time-to-live for a cached DNS name, in seconds. Specify a value from 0 to 4294967295 seconds. If 0, names will not be cached.
dhcp-arbitration	Specifies the amount of time, in seconds, that the print server will wait for DHCP configuration offers. A value from 1 to 10 may be set. The default is 5 seconds.
phone-home-config	Specifies privacy settings on the print server during embedded Web server access. This command controls whether statistical data on product use may be sent to HP. For HP to collect data, Internet access is required. **2**: Prompt the user to allow sending data on initial access to the Networking tab of the embedded Web server. This is the factory-default and cold-reset value. Once changed, this value cannot be re-selected. **1**: Allows the sending of data to HP without prompting the user. **0**: Disables sending data to HP without prompting the user.
TCP/IP Diagnostics	
Last Config IP	(Read-only parameter) The IP address of the system from which the HP Jetdirect print server's IP address was configured.
TCP Conns Refused	(Read-only parameter) The number of client TCP connections that are refused by the print server.
TCP Access Denied	(Read-only parameter) The number of times that client systems were denied access to the print server because there was no allowable entry in the print server's host access list.
DHCP Lease Time	(Read-only parameter) DHCP IP address lease duration time (seconds).
DHCP Renew Time	(Read-only parameter) DHCP T1 timeout, specifying the DHCP lease renewal time (seconds).
DHCP Rebind Time	(Read-only parameter) DHCP T2 timeout, specifying the DHCP lease rebind time (seconds).
SNMP	
snmp-config	Enables or disables SNMP operation on the print server. 0 disables, 1 (default) enables SNMP.

Table 3-3 Telnet Commands and Parameters (continued)

	CAUTION Disabling SNMP will disable all SNMP agents (SNMP v1, v2, v3) as well as communications with management applications, such as HP Web Jetadmin. In addition, firmware upgrades through current HP downloading utilities will be disabled.
get-cmnty-name	Specifies a password that determines which SNMP GetRequests the HP Jetdirect print server will respond to. This is optional. If a user-specified get community name is set, the print server will respond to either a user-specified community name or the factory-default. The community name must be ASCII characters. The maximum length is 255 characters.
set-cmnty-name	Specifies a password that determines which SNMP SetRequests (control functions) the HP Jetdirect print server will respond to. The community name of an incoming SNMP SetRequest must match the print server's “set community name” for the print server to respond. (For additional security, you may limit configuration access through the print server's host access list.) Community names must be ASCII characters. The maximum length is 255 characters.
default-get-cmnty	Enables or disables the default Get community name. 0 disables, 1 (default) enables. Disabling this parameter may prohibit communications with SNMP management applications.
SNMP Traps	
auth-trap	Configures the print server to send (on) or not send (off) SNMP authentication traps. Authentication traps indicate that an SNMP request was received, but the community name check failed. 0 is off, 1 (default) is on.
trap-dest	Enters a host IP address into the HP Jetdirect print server's SNMP trap destination list. The command format is: trap-dest: `ip-address [community name] [port number]` The default community name is ‘public’; the default SNMP port number is ‘162’. The port number cannot be specified without a community name. To delete the table, use ‘trap-dest: 0’. If the list is empty, the print server does not send SNMP traps. The list may contain up to three entries. The default SNMP Trap Destination List is empty. To receive SNMP traps, the systems listed on the SNMP trap destination list must have a trap daemon to listen to those traps.
IPX/SPX	
ipx-config	Enables or disables IPX/SPX protocol operation on the print server. 0 disables, 1 (default) enables. For example, `ipx-config 0` will disable IPX/SPX operation.
ipx-unitname	(Print Server Name) A user-assigned alphanumeric name assigned to the print server (31 characters maximum). By default, the name will be NPIxxxxxx, where xxxxxx are the last six digits of the LAN hardware address.
Address	(Read-only parameter) Identifies the IPX network and node numbers detected on the network, in the form NNNNNNNN:hhhhhhhh (hexadecimal), where NNNNNNNN is the network number and hhhhhhhh is the LAN hardware address of the print server.

Table 3-3 Telnet Commands and Parameters (continued)

ipx-frametype	Specifies the IPX frame type settings available for your print server model: **AUTO** (default), **EN_SNAP, EN_8022, EN_8023, EN_II**. For more information, see HP Jetdirect Configuration Pages.
ipx-sapinterval	Specifies the time interval (1 to 3600 seconds) that the HP Jetdirect print server waits between Service Advertising Protocol (SAP) broadcasts on the network. The default is 60 seconds. 0 disables SAP broadcasts.
ipx-mode	(Read-only parameter) Specifies the NetWare mode configured on the print server, either RPRINTER or QSERVER mode.
ipx-nds-tree	An alphanumeric string, up to 31 characters, that specifies the NDS tree name for the print server.
ipx-nds-context	An alphanumeric string, up to 256 characters, that specifies the NDS context for the HP Jetdirect print server.
ipx-job-poll	Specifies the time interval (1 to 255 seconds) that the HP Jetdirect print server will wait to check for print jobs in a print queue. The default is 2 seconds.
pjl-banner (ipx-banner)	Enables or disables printing an IPX banner page through Printer Job Language (PJL). **0** disables banner pages. **1** (default) enables banner pages.
pjl-eoj (ipx-eoj)	Enables or disables IPX end-of-job notification through PJL. **0** disables, **1** (default) enables.
pjl-toner-low (ipx-toner-low)	Enables or disables IPX toner-low notification through PJL. **0** disables, **1** (default) enables.
AppleTalk	
appletalk	Enables or disables AppleTalk (EtherTalk) protocol operation on the print server. 0 disables, 1 (default) enables. For example, `appletalk 0` will disable AppleTalk operation
Name	(Read-only parameter) The name of the printer on the AppleTalk network. A number after the name indicates that there are multiple devices with this name, and this is the Nth instance of the name.
Print Type	(Read-only parameter) Specifies the AppleTalk network printer type reported by the Jetdirect print server. Up to three print types may be reported.
Zone	(Read-only parameter) The name of the AppleTalk network zone on which the printer is located.
Phase	(Read-only parameter) AppleTalk phase 2 (P2) is preconfigured on the HP Jetdirect print server.
Status	(Read-only parameter) Indicates the current AppleTalk configuration status. **READY**: Indicates the HP Jetdirect print server is awaiting data. **DISABLED**: Indicates that AppleTalk was manually disabled. **INITIALIZING**: Indicates that the print server is registering the node address or name. An additional status message may also be displayed.
DLC/LLC	
dlc/llc-config	Enables or disables DLC/LLC protocol operation on the print server. **0** disables, **1** (default) enables. For example, `dlc/llc-config 0` will disable DLC/LLC operation.

Table 3-3 Telnet Commands and Parameters (continued)

strict-8022	Controls DLC/LLC protocol interpretation: **0** (default): disables, that is, provides loose interpretation. **1**: enables, that is, provides strict interpretation).
Other	
upgrade	To configure one or more Jetdirect print servers with the name and location of a firmware upgrade file. **CAUTION** Ensure that command parameters are properly entered and that the upgrade file is a higher version than the currently installed version. The print server will attempt to upgrade when the upgrade file contains a higher version than the installed version. The command format is: `upgrade: <TFTP server IP> <Version> <Product Number> <Filename>` where, `<TFTP Server IP>` is the IP address of the TFTP server, `<Version>` specifies the firmware version of the upgrade file, `<Product Number>` specifies and must match the product number of the print server, `<Filename>` is the path and filename of the firmware upgrade file.
laa	Specifies a locally administered address (LAA) that replaces the factory-assigned LAN Hardware (MAC) address. If LAA is used, a user-specified string of exactly 12 hexadecimal digits must be entered. For Ethernet print servers, the LAA address must start with hexadecimal X2, X6, XA, or XE, where X is any hexadecimal digit 0 through F. The default address is the factory-assigned address.
1000t-pause-conf	This command is used for flow control of inbound and outbound data. **OFF** or **0**: (Default) Flow control is disabled. **AUTO** or **1**: Flow control is configured through auto-negotiation with the network switch. **RCV** or **2**: Flow control is enabled only for data received from the network. **TRANS** or **3**: Flow control is enabled only for data transmitted to the network. **TXRX** or **4**: Flow control is enabled for both received and transmit data.
link-type	(For wired 10/100/1000T Ethernet) Sets the print server's link speed (10, 100, 1000 Mbps) and communication mode (Full- or Half-Duplex). The available link-speed selections depend on the print server model. The selections that may be displayed are listed below. **CAUTION** If you change the link setting, network communications with the print server and network device may be lost. **AUTO** (default): **1000FULL**: 1000 Mbps, full-duplex operation. **100AUTO**: Limits auto-negotiation to a maximum link speed of 100 Mbps. **100FULL**: 100 Mbps, full-duplex operation.

Table 3-3 Telnet Commands and Parameters (continued)

	100HALF: 100 Mbps, half-duplex operation. **10FULL**: 10 Mbps, Full-duplex operation. **10HALF**: 10 Mbps, half-duplex operation.
Support	
Web JetAdmin URL	(Read-only parameter) If HP Web Jetadmin discovers this device, the URL to access HP Web Jetadmin will be specified.
Web JetAdmin Name	(Read-only parameter) If HP Web Jetadmin discovers this device, the name of the HP Web Jetadmin host will be specified (if known).
support-contact	Typically used to identify the name of a person to contact for support of this device.
support-number	Typically used to specify a phone or extension number to call for support of this device.
support-url	A Web URL address for product information on this device over the Internet or an intranet.
tech-support-url	A Web URL address for technical support over the Internet or an intranet.

Menu Interface

An optional Menu interface is displayed when you type menu at the Telnet command prompt. The Menu interface eliminates the need to memorize commands, and provides structured menu lists for easy access to configuration parameters.

Figure 3-1 Example: Using the Menu Interface illustrates the Menu interface, using the TCP/IP menus as an example.

- From the **Main Menu** screen, select and enter a menu number. If there are submenus, select and enter a submenu number.
- If you want to change a parameter setting, enter “Y” (for “Yes”) when prompted.

  Changes to parameters are made by editing the setting through the use of the Backspace key. If an unrecognized value is entered, the correct entry options will be displayed.

NOTE Changes are not saved on the Jetdirect print server until you exit a menu and, when prompted, choose to save your changes.

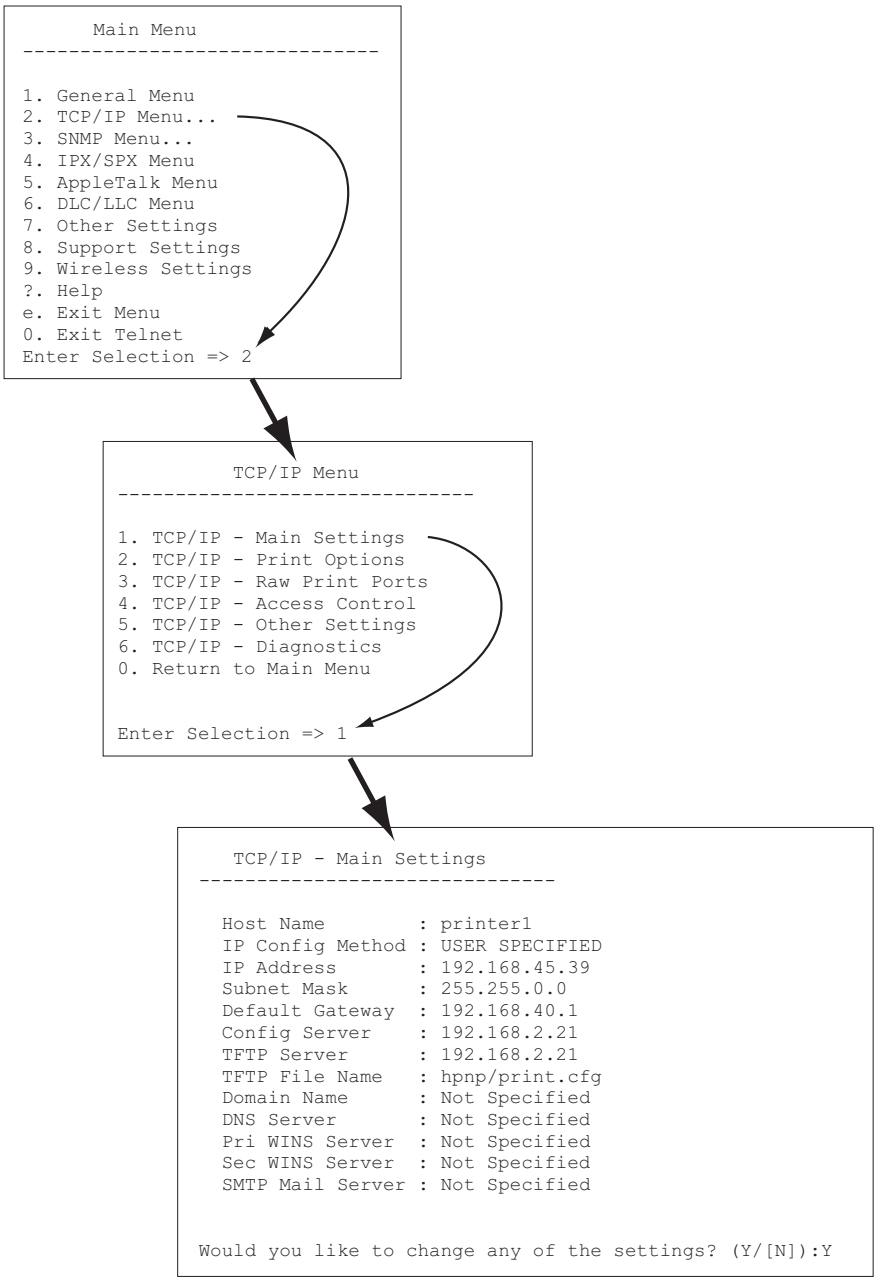


Figure 3-1 Example: Using the Menu Interface

To edit these parameters, enter Y. Use the Backspace key to edit the parameters.

Changes are not saved until you save them when you exit the session.

Using Telnet to Erase the Existing IP Settings

To erase the IP address during a Telnet session, use the following command line entries:

1. Type `cold-reset`, then press Enter.
2. Type `quit`, then press Enter to exit Telnet.
3. Power the print server off/on.

NOTE This procedure resets all TCP/IP parameters, but only affects the TCP/IP subsystem. Parameters for other subsystems such as IPX/SPX or AppleTalk are not affected.

To reset all parameters to factory default values, refer to Troubleshooting the HP Jetdirect Print Server.

Moving to Another Network (IPv4)

When moving an HP Jetdirect print server that is configured with an IP address to a new network, make sure that the IP address does not conflict with addresses on the new network. You may change the IP address of the print server to one that can be used on the new network, or erase the current IP address and configure another address after it is installed on the new network. See Troubleshooting the HP Jetdirect Print Server for instructions to reset the print server to factory default settings.

If the current BOOTP server is not reachable, you may need to locate a different BOOTP server and configure the printer to this server.

If the print server was configured using BOOTP, DHCP or RARP, edit the appropriate system files with updated settings. If the IP address was manually set (for example, from the printer control panel or Telnet), reconfigure IP parameters as described in this chapter.

Using the Embedded Web Server

You can use the embedded Web server on the HP Jetdirect print server to configure or view IPv4 and IPv6 parameters. For more information, refer to HP Jetdirect Embedded Web Server (V.31.xx).

Using the Printer Control Panel

When supported by the printer, HP Jetdirect internal print servers provide a configuration menu that can be accessed from the printer's control panel. Using this menu, you can enable or disable network protocols and set basic network parameters.

NOTE For instructions on using the control panel for your printer, refer to your printer documentation.

In addition to configuration of IPv4 and other network protocols, HP Jetdirect 635n print servers support the configuration of selected IPv6 and IPsec networking parameters through the control panel.

When accessing the HP Jetdirect menu from the printer's control panel, some TCP/IP network configuration parameters that you can set include the following (see The HP Jetdirect EIO Control Panel Menu for additional parameters):

- IP host name
- TCP/IPv4 settings
- TCP/IPv6 settings
- Other network protocols (IPX/SPX, AppleTalk, DLC/LLC)
- Security settings
- Link configuration settings

If you need to configure more TCP/IP parameters than allowed by control panel configuration, use an alternate configuration tool (such as Telnet/IPv4 or the embedded Web server) as described in this guide.

If the HP Jetdirect print server is configured with TCP/IP parameters from the printer control panel, the configuration is saved on the print server when powered off/on.

4 HP Jetdirect Embedded Web Server (V.31.xx)

HP Jetdirect print servers contain an embedded Web server that can be accessed from a compatible Web browser over an intranet. The embedded Web server provides access to configuration and management pages for the HP Jetdirect print server and the attached network device (such as a printer or multifunction, all-in-one device).

Tabs across the upper portion of your browser window provide access to device and networking pages. The tabs and functions displayed will vary depending on the capabilities of the device and the HP Jetdirect print server firmware version:

- If the attached device can serve up its own Web pages, then the available tabs and functions provided by the device are displayed, along with a **Networking** tab served by the Jetdirect print server. For a description of the device pages, see the embedded Web server documentation supplied with your printer or MFP device.
- If Web pages for the attached device are not available, then the Jetdirect print server provides two tabs: **Home** and **Networking**.

Typical **Home** and **Networking** tabs served by the HP Jetdirect print server are illustrated in Figure 4-1 Typical HP Jetdirect Home Tab and Figure 4-2 HP Jetdirect Networking Tab, respectively. For more information, see the “HP Jetdirect Home Tab” and the “Networking Tab”.

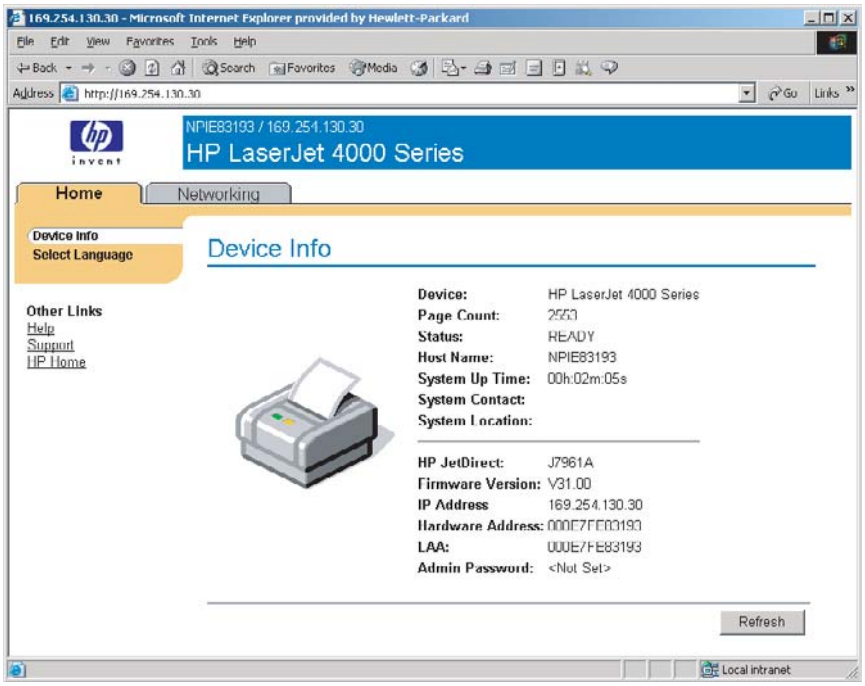


Figure 4-1 Typical HP Jetdirect Home Tab

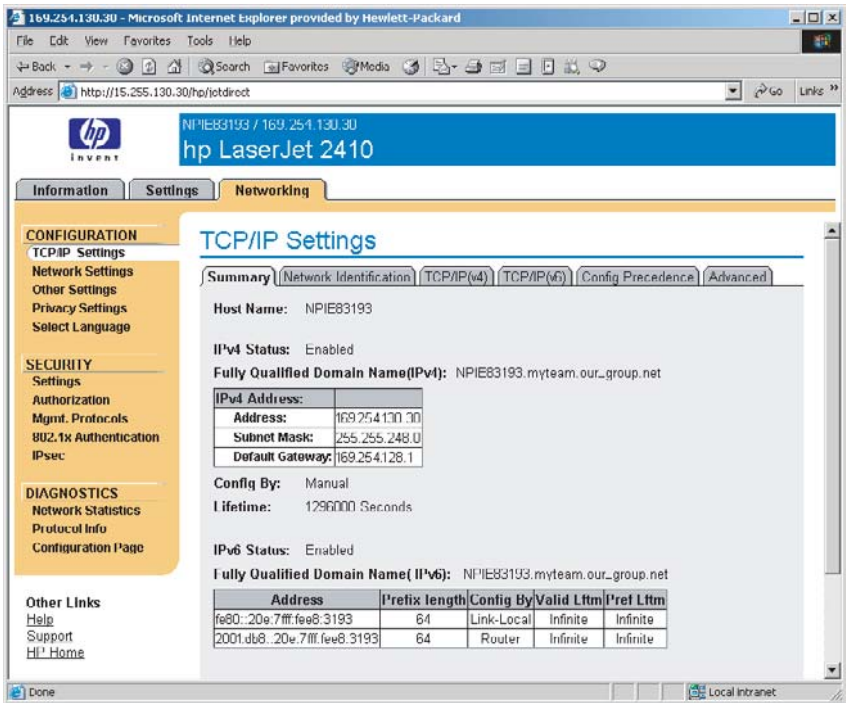


Figure 4-2 HP Jetdirect Networking Tab

For network parameter descriptions, see “Networking Tab”.

Requirements

Compatible Web Browsers

To access the embedded Web server, you must use a compatible Web browser. In general, the embedded Web server can be used with Web browsers that support HTML 4.01 and cascading style sheets.

Hewlett-Packard tests a number of current and older browsers using a variety of systems. In general, we recommend using the following browsers:

- Microsoft Internet Explorer 5.0 or greater
- Netscape Navigator 6.0 or greater
- Mozilla Firefox 1.x or greater

Browser Exceptions

Due to known problems experienced during testing, we recommend that you do not use the following browsers:

- Netscape Navigator 6.2.x with SSL

Supported HP Web Jetadmin Version

HP Web Jetadmin is a browser-based, enterprise management tool for network devices. It is available from HP online support at the following URL:

http://www.hp.com/go/webjetadmin

To make use of improved security features, HP Web Jetadmin version 7.8 or greater is recommended for operation with the HP Jetdirect embedded Web server. Using HP Web Jetadmin, you can enable the IPv4 SNMP v3 agent and seamlessly create an SNMP v3 account on the print server.

NOTE HP Web Jetadmin 7.8 does not support SNMP configuration over IPv6 protocols. However, Jetdirect MIB configuration objects (such as IPv6 and IPsec objects) may be viewed over IPv4.

A link to HP Web Jetadmin will be displayed on the embedded Web server if HP Web Jetadmin has discovered this device through an Integration URL.

Currently, browser support between HP Web Jetadmin and the embedded Web server may differ. For supported browsers with HP Web Jetadmin, visit http://www.hp.com/go/webjetadmin.

Viewing the Embedded Web Server

Before you can use the embedded Web server, the HP Jetdirect print server must be configured with an IP address.

Using IPv6 protocols, IPv6 addresses are typically configured automatically on the print server, although manual configuration is available. For basic information on IPv6 addresses, see TCP/IP Configuration.

Using IPv4 protocols, there are many ways to configure an IPv4 address on the print server. For example, you can automatically configure IP parameters over the network using BOOTP (Bootstrap Protocol) or DHCP (Dynamic Host Configuration Protocol) each time the print server is turned on. Or, you can manually configure IP parameters using the printer's control panel (for selected printers with internal print servers), Telnet, the “arp” and “ping” commands, HP Web Jetadmin or other management software. For more information on TCP/IP configuration options, see TCP/IP Configuration.

When powered on, an HP Jetdirect print server that is unable to retrieve a valid IP address from the network will automatically assign itself either a legacy default IPv4 address 192.0.0.192 or a link-local address in the range 169.254.1.0 to 169.254.254.255. The IP address configured on your print server can be determined by inspecting the Jetdirect configuration page for the print server. See TCP/IP Configuration for more information.

If the legacy default IPv4 address 192.0.0.192 has been assigned, you must temporarily set up your computer with the same IP network number or establish a route to the print server before you can gain access to the embedded Web server.

To access the embedded Web server, perform the following steps:

1 Run a supported Web browser.

2 Enter the IP address or fully qualified domain name of the print server as the URL.

NOTE For browsers that support direct IPv6 addresses, an IPv6 address is typically enclosed in brackets ([ ]).

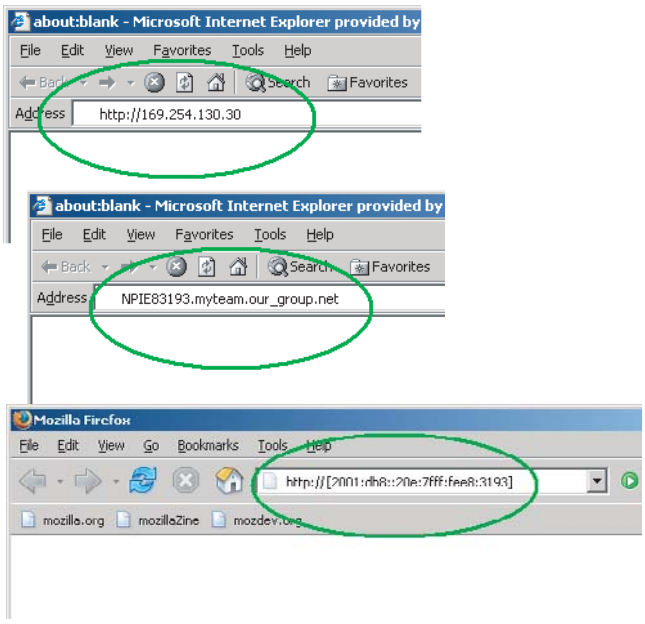


Figure 4-3 Entering an IP Address or Fully Qualified Domain Name

3 If prompted with security alerts, click **Yes** to proceed.

Unlike prior HP Jetdirect print servers, a factory-default HP Jetdirect 635n print server is pre-configured as a secure site, using an X.509-compliant certificate installed on the print server for

identification. Encrypted browser communications through HTTPS (secure HTTP) is required for initial access.

Although not recommended, you can use your **Internet Options** menu to configure your browser to ignore security warnings if the print server is configured to operate through HTTPS. See Mgmt. Protocols.

4 An embedded Web server page will be displayed, either the Home page of the HP Jetdirect print server or a device page served by the device.

Operating Notes

- If you enter or change a configuration parameter value, click **Apply** to enable your change, or click **Cancel** to erase your change.
- Changes to the IP address will close the connection to the embedded Web server. To re-establish a connection, use the new IP address.

  CAUTION Changes to the IP address on the HP Jetdirect print server may result in printing failures for clients that have been configured to print to this printer using the previous IP address.

- Novell NetWare networks: On the **Network Settings** page, use the **IPX/SPX** tab to configure Novell Directory Services (NDS) Queue Server mode parameters. Note that the embedded Web server cannot create NDS objects (print server, printer, and print queue objects) on the Novell server. To create these objects, use a Novell NetWare utility, such as NWAdmin, or configure the IPX/SPX stack for NDS through HP utilities, such as HP Web Jetadmin.

HP Jetdirect Home Tab

The **Home** tab will display the HP Jetdirect home page if a Web server in the attached device cannot be accessed or does not exist. The HP Jetdirect home page displays a generic printer graphic to represent the attached device. The HP Jetdirect print server's product model, firmware version, and network addresses are displayed along with any device information that can be retrieved. Table 4-1 HP Jetdirect Home Page Items provides a summary of the items displayed on the HP Jetdirect home page.

Table 4-1 HP Jetdirect Home Page Items

Item	Description
Home tab	Displays the Jetdirect Home page. This tab will not appear if Web pages served by the attached device can be accessed.
Networking tab	Provides access to network configuration, security, and diagnostic parameters. For more information, see Networking Tab.
Device Info	Identifies the device (such as the model name of the printer or multifunction all-in-one device) connected to the network through the HP Jetdirect print server. Other information that can be retrieved from the device are also displayed (such as Page Count, or Control Panel status). The information will vary depending on the features of the attached device.
Select Language	Appears if the HP Jetdirect Web pages support multiple languages. Supported languages may also be selected through language preference settings in your browser.

Table 4-1 HP Jetdirect Home Page Items (continued)

Item	Description
	To display supported non-English languages, the use of cookies must be enabled in your browser settings.
Host Name	Specifies the IP host name assigned to the device and stored on the HP Jetdirect print server. The default host name is NPIxxxxxx, where xxxxxx are the last six digits of the LAN hardware (MAC) address. See TCP/IP on the Networking Tab.
System Up Time	The length of time since either the HP Jetdirect print server or the network device was last powered off/on.
System Contact	A text string (stored on the HP Jetdirect print server) for the name of a person to contact for this device. See TCP/IP on the Networking Tab.
System Location	A text string (stored on the HP Jetdirect print server) that identifies the physical location of this device. See the Networking TCP/IP configuration pages.
HP Jetdirect	The product number of the HP Jetdirect print server (for example HP J7961A).
Firmware Version	The version of the operating instructions installed on the HP Jetdirect print server.
IP Address	The Internet Protocol address configured on the HP Jetdirect print server.
Hardware Address	The LAN hardware (or MAC, Media Access Control) address of the HP Jetdirect print server. This unique address is assigned by Hewlett-Packard, but can be locally administered.
LAA	A Locally Administered Address (LAA) that replaces the LAN Hardware (MAC) address. The LAA may be configured under local control by a network administrator. By default, the LAA is the factory-assigned LAN Hardware address.
Admin Password	Specifies whether or not an administrator password has been set. This password may also be configured through a Telnet session with the HP Jetdirect print server, or from HP Web Jetadmin. Because passwords are synchronized with selected printers, the password may have also been set through printer security Web pages. Use the **Admin Password** page to set or clear administrator passwords. If an administrator password has been set, you will be prompted for a User Name and Password to access network parameters. For more information, click Help, or see the Admin. Account section in this guide.

Device Tabs

In place of the Home tab, various device tabs may appear if the attached network device (such as the printer or multifunction all-in-one device) contains a supported embedded Web server. Device tabs provide access to the Web pages served by the device. If available, see the embedded Web server guide for the device. This guide is typically supplied with many HP LaserJet printers.

Networking Tab

The **Networking** tab provides access to HP Jetdirect network configuration parameters and status. The menu items in the left margin provide access to configuration and status pages.

Table 4-2 Networking Menu Items

CONFIGURATION section

Table 4-2 Networking Menu Items (continued)

■ TCP/IP Settings ■ Network Settings ■ Other Settings ■ Privacy Settings ■ Select Language
SECURITY section
■ Security: Settings ■ Authorization ■ Mgmt. Protocols ■ 802.1x Authentication ■ IPsec
DIAGNOSTICS section
■ Network Statistics ■ Protocol Info ■ Configuration Page

Sending Product Information to HP

The first time that you access the **Networking** tab in the embedded Web server, you will be prompted to allow the sending of product information to HP using the Internet. Product identification and usage data collected by HP will be used to improve product features and services. Personal data is not collected in accordance with HP privacy policies. See Hewlett-Packard Online Privacy Statement.

If you choose to decline by pressing **No**, a log entry to record this choice may be sent to HP. To prevent HP from making a log entry that data collection was refused, do one of the following:

- Disable access to the Internet before pressing **No**.

  You can disable Internet access on your browser, for example, by disabling the Web Proxy server. After pressing **No**, simply re-enable Internet access.

- Use Telnet (IPv4) to disable this functionality before pressing **No**.
  - Telnet to the IP address of the Jetdirect print server.
  - If prompted for a user name and password, enter "`Admin`" for the user name. Then enter the password assigned to the print server.
  - Enter the following Telnet command "`phone-home-config: 0`"
  - To exit and save your settings, enter the command "`quit`". The Telnet program will ask if you wish to save this information. Be sure to type "`Y`" for Yes.
- Use an IPv4 SNMP management utility or an IPv4 SNMP command line utility to disable this functionality before pressing **No**. The object identifier (OID) is .1.3.6.1.4.1.11.2.4.3.7.31.0 and needs to be set to zero (0).

You can choose to enable or disable this feature at any time using the **Privacy Settings** page under the **Networking** tab.

TCP/IP Settings

In firmware version V.31.xx, the **TCP/IP Settings** menu combines all TCP/IP configuration parameters, some of which had been formerly contained in the **Network Settings** menu. You can access the following tabs:

- Summary
- Network Identification
- TCP/IP(v4)
- TCP/IP(v6)
- Config Precedence
- Advanced

Summary

This tab provides a summary of the TCP/IP configuration. Items on this page are listed below.

Table 4-3 TCP/IP Summary tab

Item	Description
Host Name	Specifies the IP host name assigned to the device and stored on the HP Jetdirect print server. To configure a host name, see the **Network Identification** tab.

Table 4-3 TCP/IP Summary tab (continued)

Item	Description
IPv4 status	Indicates the status of IPv4 operation. IPv4 cannot be disabled from the embedded Web server in this release.
Fully Qualified Domain Name (IPv4)	The fully qualified domain name consists of the device's host name and domain name.
IPv4 Address	Identifies the IPv4 address, subnet mask and default gateway for the print server.
Config By	Specifies how the IPv4 parameters were configured: DHCP, BOOTP, Manual, or Auto IP.
IPv6 Status	Indicates the status of IPv6 operation. IPv6 can be enabled or disabled throught the embedded Web server.
Fully Qualified Domain Name (IPv6)	The fully qualified domain name consists of the device's host name and domain name. Depending on the network architecture, it can be the same as, or different from, the IPv4 fully qualified domain name.
IPv6 Address list	IPv6 addresses configured on the print server are listed. For each address, the following items are specified: ■ Prefix length: identifies the number of bits that comprise the fixed portion of the address. Typically, it is 64 and identifies network/subnet portion of the address. ■ Config By: identifies how the address was configured, such as auto-configuration through link-local addressing, by a Router, by a DHCP(v6) server, or configured manually. ■ Valid Lftm: The length of time (lifetime) that the address can be used, after which the address becomes invalid. This value is determined during the auto-configuration process. ■ Pref Lftm: The length of time (lifetime) that the address can be used without limitation, but after which the address is deprecated — its use is discouraged. The preferred lifetime is a subset of the valid lifetime. This value is determined during the auto-configuration process.
Default Route Information	If a router advertises itself to the print server as a default router on the local link, its address and the length of time that it may be used are displayed.

Network Identification

This tab provides TCP/IP network identification . Items on this page are listed below.

Table 4-4 TCP/IP Network Identification tab

Item	Description
Host Name	Specifies a readable IP name (the SNMP SysName object) for the network device. The name must start with a letter and can end in a letter or number, up to 32 ASCII characters. The default name is NPIxxxxxx, where xxxxxx are the last six digits of the LAN hardware (MAC) address.
IPv4 Domain Name IPv6 Domain Name	Specifies the name of the Domain Name System (DNS) domain that the HP Jetdirect print server resides in (for example, support.hp.com). It does not include the host name; it is not the Fully Qualified Domain Name (such as printer1.support.hp.com). The IPv4 and IPv6 domain names may be the same or different depending on the network.

Table 4-4 TCP/IP Network Identification tab (continued)

Item	Description
DNS (IPv4) DNS (IPv6)	Use the fields provided to configure the print server with primary and secondary Domain Name System (DNS) servers on your IPv4 or IPv6 networks. Primary: Specify the IP address of the primary DNS (Domain Name System) server. Secondary: Specify the IP address of a secondary DNS server to use if the primary DNS server is unavailable.
WINS (IPv4 only)	Use the fields provided to configure the print server with preferred and alternate Windows Internet Naming Service (WINS) server on your IPv4 network. Like DNS, WINS provides IP address and name resolution services for network computers and devices. Preferred: Specify the IP address of the primary WINS server. Alternate: Specify the IP address to be used for WINS if the preferred WINS Server is unavailable.
mDNS (IPv4 only)	Use this section to specify the Multicast Domain Name System (mDNS) Service Name, or to identify the assigned mDNS Domain Name. ■ mDNS Service Name: This name is persistent and is used to resolve a particular device or service if socket information (such as the IP address) changes from session to session. The default service name is the printer model along with the last six digits of the LAN Hardware (MAC) address. To change the name assigned to this device or service, enter an alphanumeric string of up to 64 ASCII characters. ■ Domain Name: (Read-only parameter) Specifies the mDNS domain name assigned to the device, in the form <host name>.local. If a host name has not been assigned, the default host name NPIxxxxxx is used, where xxxxxx are the last 6 digits of the LAN hardware (MAC) address.

TCP/IP(v4)

The TCP/IP(v4) tab allows you to configure basic IPv4 settings on the print server. For additional parameters, see the **Advanced** tab.

Table 4-5 TCP/IP(v4) tab

Item	Description
IP Configuration Method	Selects the method that the HP Jetdirect print server will use for its IP configuration parameters: BOOTP (default), DHCP, Manual, or Auto IP. For BOOTP or DHCP, the IP parameters will be automatically configured by a BOOTP or DHCP server each time the print server is powered on. If you select Manual, then basic IP parameters can be manually entered using this Web page, or using other available tools. If you select Auto IP, then a unique link-local address 169.254.x.x will be assigned. For more information, see TCP/IP Configuration.
IP Address	Use this field to manually assign the Internet Protocol address on the HP Jetdirect print server. The IP address is a four byte (32-bit) address in the form “n.n.n.n”, where ‘n’ is a number from 0 to 255.

Table 4-5 TCP/IP(v4) tab (continued)

Item	Description
	An IP address uniquely identifies a node on a TCP/IP network. Duplicate IP addresses on a TCP/IP network are not allowed.
Subnet Mask	If subnetting is used, use this field to manually assign a subnet mask. A subnet mask is a 32-bit number that, when applied to an IP address, determines which bits specify the network and subnet, and which bits uniquely specify the node.
Default Gateway	Identifies the IP address of a router or computer that is used to connect to other networks or subnetworks.
Default IP	Specifies the IP address to use when the print server is unable to obtain an IP address from the network during a forced TCP/IP reconfiguration (for example, when manually configured to use BOOTP/DHCP). **LEGACY DEFAULT_IP**: sets the legacy default IP address 192.0.0.192. **AUTO_IP**: sets a link-local IP address 169.254.x.x. The initial setting is determined by the IP address obtained when first powered on.
Send DHCP requests	A checkbox is used to specify whether DHCP requests will be periodically transmitted when a legacy default IP address 192.0.0.192 or link-local IP address 169.254.x.x has been automatically assigned. Clear the checkbox to disable DHCP requests. Check the checkbox (default) to enable DHCP requests.

TCP/IP(v6)

Use the TCP/IP(v6) tab to enable IPv6 operation, view IPv6 auto-configuration addresses, or manually configure IPv6 addresses. For basic information on IPv6 addresses on the print server, see TCP/IP Configuration. For additional parameters that can be configured, see the **Advanced** tab.

Table 4-6 TCP/IP(v6) tab

Item	Description
IPv6 Enable	Enter a check mark in this checkbox to enable IPv6 operation. Clear this checkbox to disable IPv6.
Link-Local Address	(Read only parameter) This item specifies the print server's IPv6 link-local address and prefix length. Like other IPv6 hosts, the print server configures this address automatically. The link-local address allows the print server to communicate with other IPv6 hosts on the local link without routers.
Stateless Addresses	(Read only parameters) The stateless addresses (and prefix lengths) configured on the print server are listed. Stateless addresses are assigned under the control of a router.
DHCPv6 Addresses	This section allows you to configure the DHCPv6 policy that the print server uses for stateful addresses, assigned by a DHCPv6 server.

Table 4-6 TCP/IP(v6) tab (continued)

Item	Description
	To set the DHCPv6 policy, select one of the following: ■ **Perform DHCPv6 only when requested by a router**: (default) Allow the router to control stateful addressing. ■ **Perform DHCPv6 when stateless configuration is unsuccessful**: Attempt to use DHCPv6 if stateless addressing by a router fails. ■ **Always perform DHCPv6 on startup**: The print server should always attempt DHCPv6 for configuration each time it is powered on. If DHCPv6 is used for stateful addressing, the addresses (and associated prefixes) configured on the print server will be listed.
Manual Address	Use this section to manually configure an IPv6 address on the print server, and to enable or disable the address. Check the **Enable** checkbox to enable an IPv6 address that has been manually configured. Clear this checkbox to disable the address, which is the default setting. Use the **Address** and **Prefix length**fields to enter an IPv6 address and its prefix length. If IPv6 address prefixes (for example, supplied by a router) have been stored on the print server, you can select a prefix from the **Prefix** field, and then click **Add** to copy the prefix into the **Address** field. Then enter the remainder of the address.

Config Precedence

This page is used to specify the methods of print server configuration that take precedence over other configuration methods. For example, if a network administrator wants to ensure that IPv4 parameters configured by a TFTP server cannot be overwritten through a manual configuration method (such as the printer control panel, Telnet, or embedded Web server), the administrator can use this page to indicate that TFTP takes precedence over manual configuration.

The factory-default precedence order is indicated below.

Table 4-7 TCP/IP Config Precedence tab

Item	Description
Configuration Methods	Specifies the precedence of the configuration methods used to configure the print server. The default precedence is indicated below, where manual configuration has the highest priority. Manual: Configuration through tools such as the printer control panel, Telnet, embedded Web server, installation and management software. TFTP: Configuration through a TFTP file from a TFTP server, typically identified during a BootP/DHCP configuration. DHCP/Bootp: Configuration from a BootP or DHCPv4 server. DHCPv6: Configuration from a DHCPv6 server. Default: Factory default configuration. To change the order of the list, select an entry and use the up or down arrows to move it.
Reset to default scheme	This button resets the precedence table to the default sequence described above.

Table 4-7 TCP/IP Config Precedence tab (continued)

Item	Description
Reinitialize Now	This button saves the new precedence table, clears the configuration method to its factory-default setting, and restarts the IP stack.
Clear Previous Values and Reinitialize Now	This button saves the new precedence table, clears the configuration method to its factory-default setting, clears current TCP/IP parameter settings, and restarts the IP stack.
Apply Cancel	The **Apply** button saves changes to the **Configuration Methods** precedence table. Depending on the changes made, you may need to turn the print server Off/On to implement the change. The **Cancel** button cancels your changes to the precedence table. **CAUTION** The Cancel button will not affect changes made by the **Reinitialize Now** or **Clear Previous Values and Reinitialize Now** buttons.

Example: To set all parameters configured through DHCP to be “Read-only”, and to allow manual configuration only of parameters that are not configured through DHCP, proceed as follows:

1. Power on the print server so that it obtains its DHCP configuration.
2. Change the precedence table to the following:

   BOOTP/DHCPv4

   DHCPv6

   TFTP

   Manual

   Default

3. Press **Clear Previous Values and Reinitialize Now**

Advanced

This tab provides configuration of additional TCP/IP parameters described below.

Table 4-8 TCP/IP Advanced tab

Item	Description
Idle Timeout	(IPv4 or IPv6) Specifies the number of seconds that an idle connection is allowed to remain open. Up to 3600 seconds can be set. 270 is the default value. If set to 0, the timeout is disabled and TCP/IP connections will remain open until closed by the device at the other end of the network (for example, a workstation).
Banner Page	(IPv4 or IPv6) Specifies whether to enable or disable printing of an LPD banner page for print jobs. For currently supported print servers, only a single port is available (Port 1).
System Contact	(IPv4 or IPv6) Identifies a person who is assigned to administer or service this device. This field may include a phone number or similar information. When configured, this parameter will be displayed on the HP Jetdirect home page.

Table 4-8 TCP/IP Advanced tab (continued)

Item	Description
System Location	(IPv4 or IPv6) Specifies the physical location of the device or related information. Only printable ASCII characters are allowed, up to 64 characters. When configured, this parameter will be displayed on the HP Jetdirect home page.
Proxy Server	(For printers/MFPs that support this feature) (IPv4 only) Specifies the proxy server to be used by embedded applications in your printer/MFP. A proxy server is typically used by network clients for Internet access. It caches Web pages, and provides a degree of Internet security, for those clients. To specify a proxy server, enter its IP address or fully-qualified domain name. The name can be up to 64 characters. For some networks, you may need to contact your Independent Service Provider (ISP) for the proxy server address.
Proxy Server Port	(For printers/MFPs that support this feature) (IPv4 only) Enter the port number used by the proxy server for client support. The port number identifies the port reserved for proxy activity on your network, and can be a value from 0 to 65535.
Proxy Server User Name	(For printers/MFPs that support this feature) (IPv4 only) If a user account on the proxy server has been set up, enter the name of the user account.
Proxy Server Password	(For printers/MFPs that support this feature) (IPv4 only) If a user account on the proxy server has been set up, enter the password of the user account.
Proxy Server Exception List	(For printers/MFPs that support this feature) (IPv4 only) Enter Web addresses, host names, or domain names that do not need to be accessed through the proxy server. Use semicolons (;) to separate entries.
TTL/SLP	(IPv4 only) Specifies the IP multicast Time To Live (TTL) discovery setting for Service Location Protocol (SLP) packets. The default value is 4 hops (the number of routers from the local network). The range is 1–15. If set to −1, multicast capability is disabled. For print servers configured for Auto IP (link-local) addresses, this field will be ignored. TTL on outbound packets will always be set to 255 and limited to the link-local network.
Syslog Server	(IPv4 only) Specifies the IP address of a host computer that is configured to receive syslog messages from the HP Jetdirect print server. If a Syslog Server is not specified, syslog messages are disabled.
Syslog Maximum Messages	(IPv4 only) Specifies the maximum number of syslog messages that can be sent by the HP Jetdirect print server on a per-minute basis. This setting allows administrators to control the log file size. The default is 10 per minute. If set to zero, no maximum number is defined.
Syslog Priority	(IPv4 only) Controls the filtering of syslog messages that are sent to the syslog server. The filter range is 0 to 8, with 0 being the most specific and 8 being the most general. Only messages that are lower than the filter level specified (that is, higher in priority) are reported. The default value is 8 which reports all syslog messages. A value of zero effectively disables syslog reporting.

Network Settings

The **Network Settings** pages allow you to set or change configuration parameters for IPX/SPX, AppleTalk, DLC/LLC, and SNMP protocols. To assign a parameter setting, enter the desired value and click **Apply**.

IPX/SPX

The **IPX/SPX** tab allows you to configure IPX/SPX (Internet Packet Exchange/Sequenced Packet Exchange) parameters on the HP Jetdirect print server for operation on a Novell NetWare or IPX/SPX-compatible network (such as a Microsoft network). See Table 4-9 IPX/SPX Settings for a description of items on this page.

CAUTION If you are using direct-mode printing over IPX/SPX on a Microsoft network, **do not** disable IPX/SPX.

For a Novell NetWare network:

- The embedded Web server may be used to select Queue Server Mode parameters in a Novell Directory Services (NDS) environment.
- You cannot create the NDS print server, printer, and queue objects using the embedded Web server. To create these objects, use other available tools or utilities.

Table 4-9 IPX/SPX Settings

Item	Description
IPX/SPX Enable	Enables or disables the IPX/SPX protocols on the HP Jetdirect print server. If the checkbox is empty, IPX/SPX is disabled.
IPX/SPX Frame Type	Specify the IPX/SPX frame type to be used by the HP Jetdirect print server on your network. After a frame type has been configured, all others will be counted and discarded. ■ All Frame Types (Auto): senses all frame types and configures the first one detected (default). ■ Ethernet 802.3 (EN_8023): limits the frame type to IPX over IEEE 802.3 frames. ■ Ethernet II (EN_II): limits the frame type to IPX over Ethernet frames. ■ Ethernet 802.2 (EN_8022): limits the frame type to IPX over IEEE 802.2 with IEEE 802.3 frames. ■ Ethernet SNAP (EN_SNAP): limits the frame type to IPX over SNAP with IEEE 802.3 frames.
SAP Interval	Specifies the time interval (in seconds) that the HP Jetdirect print server waits to send Service Advertising Protocol (SAP) messages, which are broadcast to advertise its service capabilities on a Novell NetWare network. To disable SAP messages, use the value “0”. 60 is the default value.
Print Server Name	Specify a NetWare printer name for the HP Jetdirect print server (alphanumeric characters only). The default name is NPIxxxxxx, where xxxxxx are the last six digits of the HP Jetdirect print server's LAN hardware (MAC) address.
NDS Tree Name	Specify the name of the NDS tree for this device. The NDS (Novell Directory Services) tree name refers to the name of the organizational tree used by your network. To disable NDS support, leave this field blank.

Table 4-9 IPX/SPX Settings (continued)

Item	Description
NDS Context	The print server's NDS context refers to the NDS container or organizational unit that contains the print server object. Print queue and device objects can be located anywhere within the NDS tree, but the HP Jetdirect print server must be configured with the fully-qualified print server object name. For example, if the print server object is found in the container “marketing.mytown.lj”, the fully qualified print server context name (CN) is: “OU=marketing.OU=mytown.O=lj” (where OU is an Organization Unit container and O is an Organization container within the NDS tree). The print server will also accept “marketing.mytown.lj”. To disable NDS support, leave this field blank. **NOTE** NDS objects cannot be created by the embedded Web server.
Job Poll Interval	Specifies the time interval (seconds) that the HP Jetdirect print server will wait to check for print jobs in a print queue.
PJL Configuration	For Printer Job Language (PJL) parameters, enable (check) or disable (clear) the parameters provided: ■ **Banner Page** (for printing separator pages between print jobs) ■ **End-Of-Job Notification** (if received from the printer, an end-of-job message will be forwarded to a client application) ■ **Toner Low Notification** (if received from the printer, the HP Jetdirect print server will forward a “toner low” message to a client application)

AppleTalk

The **AppleTalk** tab allows you to configure selected AppleTalk settings on the HP Jetdirect print server. See Table 4-10 AppleTalk Settings for a description of items on this page.

NOTE The AppleTalk parameters displayed include the AppleTalk printer types that are advertised on the network.

The HP Jetdirect print server supports AppleTalk Phase 2 only.

Table 4-10 AppleTalk Settings

Item	Description
AppleTalk Enable checkbox	Enable (check) or disable (clear) the AppleTalk protocol on the print server. If AppleTalk is enabled, AppleTalk parameters stored on the print server are displayed.
AppleTalk Name	Specify the name of the printer on the AppleTalk network. If you enter a name that is already assigned on your network, the AppleTalk name specified on the Jetdirect configuration page will be followed by a number to indicate that it is a duplicate.
Type	Identify the type of printer being advertised on the network. Up to two types can be displayed (for example, HP LaserJet and LaserWriter).
Zone	Select an available AppleTalk network zone for the printer. By default, the zone currently selected will be displayed.

Table 4-10 AppleTalk Settings (continued)

Item	Description
	Click the **Refresh selected zone Info** button to refresh the list of available zones.

DLC/LLC

Using the checkbox provided, you can enable (check) or disable (clear) the DLC/LLC (Data Link Control/Logical Link Control) protocols on the HP Jetdirect print server. If the checkbox is clear, DLC/LLC protocols are disabled.

SNMP

You can specify or change the SNMP (Simple Network Management Protocol) parameters provided. See Table 4-11 SNMP Settings.

CAUTION If you use HP Web Jetadmin to manage your devices, you should use HP Web Jetadmin to seamlessly configure SNMP v3 and other security settings on the print server.

Using the embedded Web server to create the SNMP v3 account will erase any existing SNMP v3 accounts. In addition, the SNMP v3 account information will need to be implemented on the SNMP management application. For more information, see SNMP v3.

Table 4-11 SNMP Settings

Item	Description
Enable SNMPv1/v2 read-write access	This option enables the SNMP v1/v2c agents on the print server. Custom community names can be configured to control management access to the print server. An SNMP Set Community Name is a password to be able to configure (or “write”) SNMP information on the HP Jetdirect print server. An SNMP Get Community Name is a password to retrieve (or “read”) SNMP information on the HP Jetdirect print server. An incoming SNMP SetRequest or GetRequest command must contain the appropriate Set or Get community name before the print server will respond. A community name must be ASCII characters and can be up to 255 characters long. The default Get community name is “public”, which can be disabled to restrict access by checking the checkbox provided. **NOTE** If “public” is disabled, some port monitors or discovery utilities may not operate properly.
Enable SNMPv1/v2 read-only access	This option enables the SNMP v1/v2c agents on the print server, but limits access to read-only. Write-access is disabled. The default Get community name “public” is automatically enabled.
Disable SNMPv1/v2	This option disables the SNMP v1/v2c agents on the print server, which is recommended for secure environments. If SNMP v1/v2c is disabled, some port monitors or discovery utilities may not operate properly.
Enable SNMPv3	(Full-featured HP Jetdirect print servers only) This option enables (check) or disables (clear) the SNMP v3 agent on the print server.

Table 4-11 SNMP Settings (continued)

Item	Description
	When enabled, an SNMP v3 account must be created on the print server, and the account information must be implemented on the SNMP v3 management application. You may create an account by providing the following information: User Name: the SNMP v3 account user name. Authentication Key: a 16-byte hexadecimal value for authenticating the SNMP packet contents using the Message Digest Algorithm 5 (MD5, RFC 1321). Privacy Key: a 16-byte hexadecimal value for encrypting the data portion of the SNMP packet using the Data Encryption Standard (DES) algorithm. Context Name: the view context in which this user can access SNMP objects. It is always “Jetdirect”.

Other Settings

This item provides access to a variety of management and printing configuration options. The following tabs are provided:

- Misc. Settings: for enabling miscellaneous advanced protocols and functions
- Firmware Upgrade: to update your HP Jetdirect print server with new features and enhancements
- LPD Queues: for setting up print queues used in printing under LPD (line printer daemon) printing services
- Support Info: to set up the **Support** link located under **Other Links** in the left margin
- Refresh Rate: to set the time interval (in seconds) for embedded Web diagnostic page updates

Misc. Settings

The Miscellaneous Settings parameters allow you to set a variety of advanced protocols and features, as described below. See Table 4-12 Miscellaneous Settings.

Table 4-12 Miscellaneous Settings

Item	Description
SLP Config	Enable or disable SLP (Service Location Protocol), used by selected client application software to automatically discover and identify the HP Jetdirect print server. If SLP will use multicast protocols, Multicast IPv4 must be enabled.
Telnet Config	Enable or disable access to HP Jetdirect configuration parameters using Telnet. For more information, see TCP/IP Configuration.
mDNS	Enable or disable Multicast Domain Name System (mDNS) services. mDNS is typically used on small networks for IP address and name resolution (through UDP port 5353) where a conventional DNS server is not used. For mDNS operation, Multicast IPv4 must be enabled.
Multicast IPv4	Enable or disable the receipt and transmission of IP version 4 multicast packets by the print server. If this parameter is disabled, other protocols that use multicast protocols, such as mDNS and SLP, may also be disabled without notification.

Table 4-12 Miscellaneous Settings (continued)

Item	Description
	NOTE If this parameter is disabled, other protocols that use multicast protocols, such as mDNS and SLP, may also be disabled without notification.
9100 Config	Enable or disable port 9100 services. Port 9100 is an HP-proprietary raw TCP/IP port on the HP Jetdirect print server and is the default port for printing. It is accessed by HP software (for example, the HP Standard Port).
FTP Printing	Enable or disable File Transfer Protocol services available on the HP Jetdirect print server for printing. For more information, see FTP Printing.
LPD Printing	Enable or disable the Line Printer Daemon services on the HP Jetdirect print server. LPD on the HP Jetdirect print server provides line printer spooling services for TCP/IP systems. For more information, see LPD Printing.
IPP Printing	Enable or disable the Internet Printing Protocol on the HP Jetdirect print server. If the printer is properly connected and accessible, IPP allows printing to this device over the Internet (or intranet). A properly configured IPP client system is also required. For information on IPP client software, see HP Software Solutions Summary.
Link settings	(For wired 10/100/1000T Ethernet) Sets the print server's link speed (10, 100, 1000 Mbps) and communication mode (Full- or Half-Duplex). The available link-speed selections depend on the print server model. The selections that may be displayed are listed below. **CAUTION** If you change the link setting, network communications with the print server and network device may be lost. ■ **AUTO** (default): The print server uses auto-negotiation to configure itself with the highest link speed and communication mode allowed. If auto-negotiation fails, either 100TX HALF or 10TX HALF is set depending on the detected link speed of the hub/switch port. (A 1000T half-duplex selection is not supported.) ■ **10T-Full**: 10 Mbps, Full-duplex operation. ■ **10T-Half**: 10 Mbps, half-duplex operation. ■ **100TX-Full**: 100 Mbps, full-duplex operation. ■ **100TX-Half**: 100 Mbps, half-duplex operation. ■ **100TX-AUTO**: Limits auto-negotiation to a maximum link speed of 100 Mbps. ■ **1000T FULL**: 1000 Mbps, full-duplex operation.
Locally Administered Address	Specifies a locally administered address (LAA) that replaces the factory-assigned LAN Hardware (MAC) address. If LAA is used, a user-specified string of exactly 12 hexadecimal digits must be entered. For Ethernet print servers, the LAA address must start with hexadecimal X2, X6, XA, or XE, where X is any hexadecimal digit 0 through F. The default address is the factory assigned address.
Syslog Facility	Specify the encoded source facility of a message (for example, to identify the source of selected messages during troubleshooting). By default, the HP Jetdirect print server uses LPR as the source facility code, but local user values of local0 through local7 can be used to isolate individual or groups of print servers.
Dynamic Raw Port Setting	Allows additional ports to be specified for printing to TCP port 9100. Valid ports are 3000 to 9000, which are application-dependent.

Table 4-12 Miscellaneous Settings (continued)

Item	Description
Disable listening on these ports	For security purposes, two fields allow you to disable services on the printer that use the network. In each field, you must specify the port numbers that are used for network communications with those services. Up to five ports may be specified in each field (for example, [5, 10, 40, 20, 50]). The valid range for port numbers is 1 through 65535. **Streams**: In this field, enter port numbers of services that pass data streams. Data streams use Transport Control Protocol (TCP) to guarantee data delivery. **Datagrams**: In this field, enter port numbers of services that pass datagrams. Datagrams, typically used for broadcast messages, use the User Datagram Protocol (UDP), a connectionless protocol where delivery and error recovery are not guaranteed.
mDNS Highest Priority Service	Specifies the mDNS highest priority service to use for printing. To set this parameter, choose one of the following printing options: 9100 Printing: Raw IP printing through HP-proprietary port 9100. IPP Printing: Internet Printing Protocol printing. LPD Printing (RAW): Default LPD raw queue printing. LPD Printing (TEXT): Default LPD text queue printing. LPD Printing (AUTO): Default LPD auto queue printing. LPD Printing (BINPS): Default LPD binary postscript queue printing. LPD Printing (<user-defined>): Up to 5 user-specified LPD queues will be listed if they have been configured, where <user-defined> is the name of the user-specified LPD print queue. The default selection will depend on the printer, typically 9100 Printing or LPD Printing (BINPS).

Firmware Upgrade

For print servers that support firmware upgrades, this page allows you to upgrade the print server with new features.

The firmware upgrade file for the print server must be available on your system. To identify and retrieve the appropriate upgrade file, visit HP online support at:

http://www.hp.com/go/webjetadmin_firmware

On that page, do the following:

1. Locate the print server model and the upgrade file.
2. Check the upgrade file version and verify that it is more recent than the print server's installed version. If it is, then download the file. If not, then you do not need to upgrade.

To upgrade the print server using the embedded Web server:

1. Enter the path to the upgrade file or click **Browse** to locate it.
2. Then click **Upgrade Firmware**.

LPD Queues

The **LPD Queues** page allows you to specify LPD (line printer daemon) print queues on the Jetdirect print server. For more information on LPD printing and print queues, see LPD Printing.

LPD printing must be enabled on the print server before you can set LPD queues. If LPD is disabled, go to the Misc. Settings tab to enable it.

If LPD printing is enabled, ten different named print queues are available. Four of these queues are configured automatically and their parameters cannot be changed. The remaining six queues can be defined by the user.

The six user-defined queues can be set up with character strings—such as job control commands—that are automatically added before or after the print job. You can define up to eight named strings, and you can set up each queue so that any of these named strings precedes the print data (“prepend string name”) or follows the print data (“append string name”).

LPD Queue Parameters for setting up LPD queues are described below. See Table 4-13 LPD Queue Parameters.

Table 4-13 LPD Queue Parameters

Item	Description
Queue Name	Name of the user-defined queue. This name can be up to 32 characters long, and can consist of any displayable ASCII characters. You can define up to six user-defined queues. **CAUTION** Avoid the differentiation of queue names through the use of lower- and upper-case characters only. Otherwise, management of LPD queues by other tools (such as Telnet) may yield unpredictable results.
Prepend String Name	Enter the name of one or more strings to be added before (or prepended to) the print data. You specify string names and values in the table at the bottom of the page. To prepend a long string, multiple string names may be concatenated, that is, entered and separated by a “+” character. For example, to prepend a long string that has been divided into two separate strings, enter: <stringname1>+<stringname2> where stringname1 and stringname2 are specified as two separate string names with different values.
Append String Name	Enter the name of one or more strings to be added after (or appended to) the print data. You specify string names and values in the table at the bottom of the page. To append a long string, multiple string names may be concatenated, that is, entered and separated by a “+” character. For example, to append a long string that has been divided into two separate strings, enter: <stringname1>+<stringname2> where stringname1 and stringname2 are specified as two separate string names with different values.

Table 4-13 LPD Queue Parameters (continued)

Item	Description
Queue Type	Processing instruction for the queue. Choose from these four queue types: ■ RAW—No processing. The line printer daemon treats the data in a *raw* queue as a print job that has already been formatted in PCL, PostScript, or HP-GL/2, and sends it to the printer without modification. (Note that any user-defined prepend or append string will be added to the job in the appropriate position.) ■ TEXT—Carriage return added. The line printer daemon treats data in *text* queues as unformatted or ASCII text, and adds a carriage return to each line before sending it to the printer. ■ AUTO—Automatic. The line printer daemon uses autosensing to determine whether the print data should be sent as *raw* or *text*. ■ BINPS—Binary PostScript. This instructs the PostScript interpreter that the printjob is to be interpreted as Binary PostScript data.
Default Queue Name	Name of the queue to be used if the queue specified for a print job is unknown. By default, the Default Queue Name is AUTO.
String Name	Name of a character string. You may define up to eight character strings for use in LPD queues; this parameter names the string, and the *Value* parameter defines the content of the string. *Prepend* and *Append* string names (specified in the table at the top of the browser window) must be chosen from the names specified here. The string name can be up to 32 characters long, and can consist of any displayable ASCII characters.
Value	The content of the string. The *String Name* parameter names the string; the *Value* parameter defines its content. When a string name is specified for a prepend or append string (in the table at the top of the browser window), the line printer daemon sends the value of that string to the printer before or after the print data (as appropriate). Character values can be anywhere in the extended ASCII range of 0 to 255 (hex 00 to FF). You can specify a non-printing character using its hexadecimal value, by entering a backslash followed by two hexadecimal characters. For example, to enter the escape character (hex 1B), type in \1B. If your string includes the backslash character itself, specify it as \5C. The maximum number of characters you can type into this field is 240. The characters in the field are checked for hexadecimal values, converted if necessary, and stored internally. The maximum number of characters stored internally in the string is 80; any characters that exceed this are discarded.

To set up a user-defined print queue, you first define the strings, assign them as prepend or append strings, and define the queue type. Once you have defined an LPD queue, you specify its use by setting up an LPD printer that uses that queue. For instance, if you set up string “a” with a value of “abc” and string “z” with a value of “xyz”, you can define print queue “az_queue” with a prepend string of “a”, an append string of “z”, and a queue type of “raw”. Then, when you send a print job consisting of <formatted_text> through queue az_queue, the job sent to the printer is “abc<formatted_text>xyz”.

Instructions for setting up an LPD printer are different for different operating systems; refer to LPD Printing for details.

Example. If you had an LPD printer and wanted to reset it at the start of each print job, you could set up a user-defined print queue named “clear_printer” that issues a PCL reset command (Escape-E) at the beginning of each job. You could set this up as follows:

First, set up the print queue:

- Name a string: Type “reset_string” into the **String Name** field in row 1.
- Define the string's value: Type “\1BE” (Escape-E) into the **Value** field in row 1. (Alternatively, you could type “\1B\45”.)
- Name the queue: Type “clear_printer” into the **Queue Name** field in row 5.
- Set up the prepend string: Type “reset_string” into the **Prepend String** field in row 5.
- Leave the **Append String** field in row 5 blank.
- Set the queue type: Using the pull-down menu, set the **Queue Type** field in row 5 to “RAW”.

Then, set up the printer to use the queue, making sure to specify “clear_printer” when asked for a queue name. (For details of setting up the printer, refer to LPD Printing.) After that, any print jobs sent to the printer—either from the server or from a client computer that has set up that printer—will include a reset command at the beginning of the job.

Support Info

Use this page to configure links for Support assistance. You can designate a Support person and phone number of an administrator for this device, as well as URL addresses for Web-based product and technical support.

Refresh Rate

The refresh rate is the time period (in seconds) that the diagnostic pages will be automatically updated. The value ‘0’ disables the refresh rate.

Privacy Settings

On the **Privacy Settings** page, you can allow the embedded Web server to collect product identification and use information and then send the information to HP (Internet access is required). Product use information assists HP in improving product features and services. The default setting for this page will depend on the user's selection on initial access to the Networking tab.

To enable this feature, check the checkbox and click **Apply**.

To disable this feature, clear the checkbox and click **Apply**.

Select Language

This link appears if the HP Jetdirect Web pages support multiple languages. Supported languages may also be selected through language preference settings in your browser (see your browser's Help).

To display supported non-English languages, the use of cookies must be enabled in your browser settings.

Security: Settings

In the **SECURITY** section, the **Settings** menu provides access to the following tabs: **Status** (default), **Wizard**, **Restore Defaults**. The available settings depend on your particular print server model.

Status

The **Status** page displays the current security configuration settings of the print server. The settings that will be displayed depend on the features supported by the print server.

Wizard

NOTE If you use HP Web Jetadmin to manage your devices, you should not use this wizard. Instead, use HP Web Jetadmin to configure your network security settings to ensure they are properly set for your network.

The **Wizard** page allows you to run the **HP Jetdirect Security Configuration Wizard**. This wizard will guide you through the print server's security configuration needed for your network. Click **Start Wizard** to run the wizard. This opens the **Security Level** page.

The optional configuration parameters presented by the wizard will depend on your choice of security level. For an overview, see Table 4-14 Wizard Security Levels.

NOTE If you improperly exit the wizard (for example, by failing to use the Cancel button), an **Operation Failed** screen may appear. If so, wait approximately two minutes before entering the wizard again.

Restore Defaults

This page is used to restore security configuration settings to factory defaults. The default settings displayed depend on the features supported by the print server.

Only the security settings listed are restored to factory defaults, other configuration settings are not affected.

Table 4-14 Wizard Security Levels

Security Level	Description
Basic Security	This option requires that you configure an administrator password for configuration management. The administrator password is shared with other management tools, such as Telnet and SNMP applications. However, some management tools, such as Telnet, use plain-text communications and are not secure. The **Administrator Account** page is used to enter the administrator password. The Administrator Password will also be used as the SNMP v1/v2 Set Community Name for SNMP management applications. The **Configuration Review** page displays all the current settings that may affect security. Click **Finish** to set your basic security selections.
Enhanced Security (Recommended)	(Full-featured print servers only) This option adds to Basic Security by automatically disabling management protocols that are do not use secure, encrypted communications (such as Telnet and FTP firmware updates, RCFG, SNMP v1/v2c). To change individual protocol settings, see Mgmt. Protocols. The **Administrator Account** page is used to enter the administrator password.

Table 4-14 Wizard Security Levels (continued)

Security Level	Description
	SNMP Configuration pages are used to configure specific SNMP settings: ■ Enable SNMPv3: (Full-featured print servers only) Enable SNMP v3 and create an SNMP v3 account. Creating an SNMP v3 account is not recommended if you manage devices using HP Web Jetadmin. See SNMP. ■ Enable SNMPv1/v2 read-only access: Enable this option to allow support of current tools that rely on SNMP v1/v2 for device discovery and status. The **Configuration Review** page displays all the current settings that may affect security. Click **Finish** to set your basic security selections.
Custom Security	This option proceeds through all available security settings supported by your print server. For more information on specific parameters and selections, see the tabs on the Mgmt. Protocols and Authorization menu pages under **SECURITY**. The **Administrator Account** page is used to enter the administrator password. The **Web Mgmt.** page (for full-featured print servers only) is used for HTTPS (secure HTTP) configuration, including certificates and encryption levels. The **Management Tools** page allows configuration of management protocols that are not secure (such as RCFG, Telnet and FTP firmware updates). **SNMP Configuration** pages are used to configure specific SNMP settings: ■ Enable SNMPv1/v2: Enable this option to allow management software that use SNMP v1/v2. If selected the SNMPv1/v2 Configuration page is displayed to configure SNMP community names. ■ Enable SNMPv3: (Full-featured print servers only) Enable this option to create an SNMP v3 account. Creating an SNMP v3 account is not recommended if you manage devices using HP Web Jetadmin. See SNMP. The **Access Control** page is used to set up an Access Control List, if desired to control host access to the device. The **Print Protocols and Services** page is used to enable or disable network printing, print services, and device discovery protocols that may affect security. The **Configuration Review** page displays all the current settings that may affect security. Click **Finish** to set your basic security selections.

Authorization

The **Authorization** page provides tabs that allow you to control access to the device, as well as to device configuration and management features. In addition, you may configure certificates for client and server authentication.

Admin. Account

Use this page to set an administrator password for controlled access to Jetdirect configuration and status information. The administrator password is shared by Jetdirect configuration tools, such as the embedded Web server, Telnet, and HP Web Jetadmin. In addition, for selected EIO printers, the password is shared with the printer (see Printer Password Synchronization below).

If a password is set and you attempt to access Jetdirect print server settings, you will be prompted for a user name and *this password* before you are allowed access.

NOTE The administrator password may be cleared by a cold reset of the print server, which resets the print server to factory default settings.

A checkbox allows you to synchronize HP Web Jetadmin and the SNMP v1/v2c Set Community Name. If you enable this feature (the checkbox is checked), the administrator password will also be used as the SNMP Set Community Name for SNMP v1/v2c management applications.

NOTE If you subsequently change the SNMP Set Community Name (for example, using the SNMP tab on the **Network Settings** page or from Web Jetadmin), the two settings will no longer be synchronized.

Printer Password Synchronization

Many EIO printers provide password-protected access to printer configuration and status settings. The password is set through security Web pages provided by the printer. For these printers, the administrator password for the printer and the Jetdirect EIO print server are synchronized so that the same password is used to access both printer and networking configuration pages. For printers that support password synchronization, the same password is used regardless of the embedded Web server page (printer **Security** page or networking **Admin. Account** page) in which the password was set.

If password synchronization is lost on these printers, recovery may require one of the following procedures:

- Restore both the printer and the Jetdirect print server to factory-default states (for example, through a cold-reset), and then reconfigure your settings.
- Manually set the same administrator password using both the printer **Security** page and the networking **Admin. Account** page.

Certificates

(Certificate support depends on the print server model) This tab provides access to installation, configuration and management services for X.509 digital certificates. A digital certificate is an electronic message typically containing, among other things, a key (a short string used for encryption and decryption) and a digital signature. Certificates may be issued and signed by a trusted third party (commonly called a Certificate Authority, or CA), which may exist internal or external to the organization. Or certificates may be “self-signed”, which is similar to validating your own identity.

NOTE While self-signed certificates are permitted and allow data encryption, they do not ensure valid authentication.

The **Certificates** page provides the status of the certificates installed on the HP Jetdirect print server:

- **Jetdirect certificate**. The Jetdirect certificate is used to validate the identity of the Jetdirect device to clients and to network authentication servers.

  By factory default, a self-signed Jetdirect certificate is preinstalled. This allows the embedded Web server to use HTTPS and appear as a secure site when accessed by a Web browser.

  Click **View** to view the contents of an installed Jetdirect certificate, or click **Configure** to update or install a new one. See Configuring Certificates.

  When installed, a Jetdirect certificate will be saved across a cold-reset, which is used to restore the print server to factory-default values.

- **CA Certificate**. (Full-featured print servers only) A certificate from a trusted third party, or Certificate Authority (CA), is used to validate the identity of a network authentication server during 802.1X authentication methods that use EAP (Extensible Authentication Protocol). The authentication server's identity is validated when information on the CA certificate matches the information on a certificate received from the authentication server.

  A CA certificate for the print server is a certificate that was used to sign the authentication server's certificate. Therefore, the Certificate Authority for the authentication server's certificate must also be used for the CA certificate.

  Click **View** to view the contents of an installed Jetdirect certificate, or click **Configure** to update or install a new one. See Configuring Certificates.

  A CA certificate is not saved when the print server is reset to factory-default values.

Configuring Certificates

When you click **Configure**, a certificate management wizard will help you update or install a certificate. The screens displayed will depend on the type of certificate (Jetdirect or CA) and your selections. Table 4-15 Certificate Configuration Screens provides a description of the screens and configuration parameters that may appear.

NOTE If you improperly exit Certificates configuration (for example, by failing to use the **Cancel** button), an **Operation Failed** screen may appear. If so, wait approximately two minutes before entering the wizard again.

Table 4-15 Certificate Configuration Screens

Certificate Options screen. The options provided will depend on your print server model. Choose an option.
■ **Update Pre-Installed Certificate**. Use this option to update the pre-installed, self-signed certificate. When updated, the pre-installed certificate is overwritten. You may update the following item: **Certificate Validity Period** With self-signed certificates, the browser will identify the certificate as self-signed for each new Web session and may cause a security alert message. This message can be bypassed if the user adds it to their browser's certificate store or disables browser alerts (not recommended). Self-signed certificates are not necessarily secure because the certificate owner is merely confirming his own identity instead of verification by a trusted third party. Certificates from a trusted third party are considered more secure.

Table 4-15 Certificate Configuration Screens (continued)

- **Create Certificate Request**. Using this option, you are prompted for specific device and organizational information in the following screen:

  Certificate Information

  This option may be used, for example, when an authentication protocol requires that a Jetdirect certificate issued by a trusted third party or Certificate Authority be installed.

- **Install Certificate**. This option is displayed only if there is a Jetdirect certificate request (to a trusted third party) pending. When received, the certificate is installed using this option. Once installed, this certificate overwrites the preinstalled certificate. Using this option, you are prompted for information in the following screen:

  Install Certificate

  The certificate to be installed must be associated with a previous certificate request generated by the embedded Web server.

- **Install CA Certificate**. (Full-featured print servers only) This option is provided when you click **Configure** for a CA certificate, which must be installed for selected authentication protocols. Using this option, you are prompted for information in the following screen:

  Install Certificate

- **Import Certificate and Private Key**. This option allows you to import a previously acquired and known certificate as the Jetdirect certificate. If you import a certificate, the currently installed certificate will be overwritten. Using this option, you are prompted by the following screen:

  Import Certificate and Private Key

- **Export Certificate and Private Key**. This option allows you to export the Jetdirect certificate currently installed on the print server for use on other print servers. Using this option, you are prompted by the following screen:

  Export the Jetdirect certificate and private key

- **Delete CA Certificate**. (Full-featured print servers only) This option is used to remove the CA certificate installed on the Jetdirect print server. This option appears when a CA certificate for EAP authentication has been installed.

  CAUTION If the CA Certificate is deleted, EAP authentication will be disabled and network access will be denied.

  The CA Certificate will also be removed on a cold-reset of the print server, where factory-default settings are restored.

Certificate Validity screen. Use this screen to specify how long the Jetdirect self-signed certificate will be valid.

- This screen appears only when a self-signed certificate is pre-installed and you click **Edit Settings** to update the validity period. It specifies the current Coordinated Universal Time (UTC). UTC is a time scale maintained by the International Bureau of Weights and Measures. It adjusts for differences between Greenwich Mean Time and atomic time. It is set at 0 degrees longitude on the prime meridian.

  The **Validity Start Date** is calculated from the PC's clock settings.

  The **Validity Period** specifies the number of days (1 to 3650) that the certificate is valid, starting from the Validity Start Date. A valid entry (1 to 3650) is required. The default is 5 years.

Certificate Information screen. Use this page to enter information for requesting a certificate from a Certificate Authority.

- **Common Name**. (Required) For HP Jetdirect print servers, specify the fully qualified domain name or a valid IP address for the device.

Table 4-15 Certificate Configuration Screens (continued)

Examples:

Domain Name: *myprinter.mydepartment.mycompany.com*

IP address: *192.168.2.116*

The Common Name will be used to uniquely identify the device. For HP Jetdirect print servers using EAP authentication, some authentication servers may need to be configured with the Common Name as specified on the certificate.

If the default IP address 192.0.0.192 is configured on the Jetdirect print server, it will not likely be valid for your network. You should not use this default address to identify your device.

- **Organization**. (Required) Specify the full legal name for your company.
- **Organizational Unit**. (Optional) Specify your department, division, or other subgroup of your organization.
- **City/Locality**. (Required) Enter the city or locality in which your organization is located.
- **State/Province**. (Required for all countries/regions) Must contain at least three characters. (required)
- **Country/Region**. Two-character ISO 3166 country/region code. For example, use “gb” Great Britain or “us” for USA (required).

Install Certificate, or Install CA Certificate screens.

Use the **Install Certificate** screen to install a Jetdirect certificate.

Use the **Install CA Certificate** screen to install a trusted Certificate Authority (CA) certificate for use during EAP authentication. (Full-featured print servers only)

- Install a PEM/Base64 (Privacy Enhanced Mail) encoded certificate.

  To install a certificate, specify the name and path of the file that contains the certificate. Or, click **Browse** to browse your system for the file.

  Click **Finish** to complete the installation.

  To install a certificate, it must be associated with a pending certificate request by the embedded Web server. The Install Certificate option will not be presented if there is no pending request.

Import Certificate and Private Key screen. Use this screen to import a Jetdirect certificate and private key.

- Import a Jetdirect certificate and private key. When imported, the existing certificate and private key will be overwritten.

  The file format must be PKCS#12 encoded (.pfx).

  To import a certificate and private key, specify the name and path of the file that contains the certificate and private key. Or, click **Browse** to browse your system for the file. Then enter the password that was used to encrypt the private key.

  Click **Finish** to complete the installation.

Export the Jetdirect certificate and private key screen. Use this screen to export the installed Jetdirect certificate and private key to a file.

- To export a certificate and private key, enter a password that will be used to encrypt the private key. You must enter the password again to confirm it. Then click **Save As** to save the certificate and private key in a file on your system. The file format will be PKCS#12 encoded (.pfx).

Access Control

Use this tab to display the Access Control List (ACL) on the HP Jetdirect print server. An access control list (or host access list) specifies individual host systems, or networks of host systems, that will be allowed to access the print server and the attached network device. Up to 10 entries can be included on the list. If the list is empty (no hosts are listed), any supported system can access the print server.

CAUTION Use caution when using this feature. You may lose your ability to communicate with the HP Jetdirect print server if your system is not properly specified in the list, or access through HTTP is disabled.

For use of the host access list as a security feature, see Security Features.

NOTE By default, hosts with HTTP connections (for example, through the embedded Web server or IPP—the Internet Printing Protocol) are allowed access to the print server regardless of access control list entries.

To disable access by HTTP hosts, clear the **Allow Web Server (HTTP) access** checkbox at the bottom of the list.

Host systems are specified by their IP addresses or network number. If the network contains subnets, an address mask may be used to identify whether the IP address designates an individual host system or a group of host systems.

Examples. See the table of sample entries below:

IP Address	Mask	Description
192.0.0.0	255.0.0.0	Allow all hosts with network number 192.
192.1.0.0	255.1.0.0	Allow all hosts on network 192, subnet 1.
192.168.1.2		Allow the host with IP address 192.168.1.2. The mask 255.255.255.255 is assumed and is not required.

To add an entry into the access control list, use the **IP Address** and **Mask** fields to specify a host, and click (check) the **Save** checkbox for that entry. Then click **Apply**.

To delete an entry from the list, clear the **Save** checkbox for that entry. Then click **Apply**.

To clear the entire access control list, clear all **Save** checkboxes, and click **Apply**.

Mgmt. Protocols

This link provides access to management communications and other protocols that affect security.

Web Mgmt.

Use this tab to manage communications with the embedded Web server from Web browsers. This tab appears only for full-featured print servers.

Secure, encrypted Web-based communication is provided through the Secure HTTP (HTTPS) protocol. If configured to require HTTPS, the embedded Web server routes HTTPS communications through port 443, the well-known port for HTTPS traffic. Although ports 80, 280, or 631 continue for

Internet Printing Protocol (IPP) use, other non-secure communications (HTTP) are redirected to HTTPS. Redirection of your browser to use HTTPS may be transparent depending on your browser's capabilities.

By factory default, unlike prior HP Jetdirect print servers, HP Jetdirect 635n print servers are configured to require HTTPS only.

Although not recommended, you may choose to accept both HTTPS and HTTP communications that are not secure by disabling (clearing) the **Encrypt All Web Communication** checkbox.

To support the use of HTTPS communications, a Jetdirect certificate must be installed. A factory-default, self-signed certificate is preinstalled for initial use. Click the **Configure** button to update the preinstalled certificate, or to install a new one. For more information, see Configuring Certificates.

The minimum encryption strength that will be allowed must be specified when using a Jetdirect certificate. You may select **Low** (default), **Medium**, or **High** encryption strength. For example, selecting **Low** will allow medium or high encryption levels to be used whereas selecting **High** will only allow high encryption levels.

For each encryption strength, ciphers are specified to identify the weakest cipher allowed.

NOTE Cipher suites support different levels of encryption strength. The cipher suites currently supported for encryption and decryption are DES (Data Encryption Standard, 56-bit), RC4 (40-bit or 128-bit), and 3DES (168-bit).

SNMP

Use this tab to enable or disable SNMP v1, v2c and v3 agents on the print server, depending on the print server model. For a description of SNMP selections, see Table 4-11 SNMP Settings.

SNMP v3

Full-featured HP Jetdirect print servers include an SNMP v3 (Simple Network Management Protocol, version 3) agent, for enhanced SNMP security. The SNMP v3 agent employs a User-based Security Model for SNMP v3 (RFC 2574), which features user-authentication and data privacy through encryption.

The SNMP v3 agent is enabled when an initial SNMP v3 account on the print server is created. Once the account is created, any SNMP management application, if properly configured, can access or disable the account.

CAUTION If you use HP Web Jetadmin to manage your devices, you should use HP Web Jetadmin to seamlessly configure SNMP v3 and other security settings on the print server.

Using the embedded Web server to create the SNMP v3 account will erase any existing SNMP v3 accounts. In addition, the SNMP v3 account information will need to be implemented on the SNMP management application.

You may create the initial account by specifying the HMAC-MD5 authentication and CBC-DES data privacy encryption keys used by your SNMP v3 management application.

CAUTION You should disable Telnet and ensure secure embedded Web communications through HTTPS is enabled before creating the initial SNMP v3 account. This will help to prevent access or interception of account information over a connection that is not secure.

SNMP v1 and v2c agents can coexist with the SNMP v3 agent. However, to fully secure SNMP access, you should disable SNMP v1 and v2c.

Other

Use this tab to enable or disable various protocols supported by the print server for printing, print services, and management. See Table 4-16 Other Protocols.

Table 4-16 Other Protocols

Item	Description
Enable Print Protocols	Enable or disable network protocols supported by the print server: IPX/SPX, AppleTalk, DLC/LLC. For example, you should disable unused protocols to prevent printer access using those protocols. For network environments that use these protocols, see Introducing the HP Jetdirect Print Server. Because it uses TCP/IP, the embedded Web server does not allow disabling TCP/IP.
Enable Print Services	Enable or disable various print services supported by the print server: port 9100, LPD (Line Printer Daemon), IPP (Internet Printing Protocol), FTP (File Transfer Protocol). Disable unused print services to prevent access through those services.
Enable Device Discovery	Enable or disable device discovery protocols supported by the print server: **SLP** (Service Location Protocol). If enabled (checked), the HP Jetdirect print server sends SLP packets, which are used by system applications for automated discovery and installation. If disabled (cleared), SLP packets are not sent. If SLP uses multicast protocols, Multicast IPv4 must be enabled. **mDNS** (multicast Domain Name System). If enabled (checked), Multicast Domain Name System (mDNS) services are provided. mDNS is typically used on small networks for IP address and name resolution (through UDP port 5353) where a conventional DNS server is not used. For mDNS operation, Multicast IPv4 must be enabled. **Multicast IPv4**. If enabled (checked), the print server will send and receive IP version 4 multicast packets. **If this parameter is disabled, other protocols that use multicast protocols, such as mDNS and SLP, may also be disabled without notification.**
Enable Management Protocols	Enable or disable Telnet access and the use of FTP to upgrade firmware on the print server. Telnet and FTP are not secure protocols and device passwords may be intercepted.

Table 4-16 Other Protocols (continued)

Item	Description
	Enable or disable RCFG, a remote IPX configuration protocol used by older management tools to configure Novell NetWare parameters. Disabling RCFG does not affect direct mode printing using IPX/SPX. Disabling Telnet, FTP firmware upgrades, and RCFG is recommended.

802.1x Authentication

(Full-featured print servers only) This page allows you to configure 802.1X authentication settings on the Jetdirect print server as required for client authentication on your network. In addition, you can reset the 802.1X authentication settings to factory-default values.

CAUTION **Use caution when changing the 802.1X authentication settings; you may lose your connection**. If communication with the printer/MFP device is lost, you may need to reset the print server to a factory-default state and then reinstall the device.

For most 802.1X networks, the infrastructure components (such as LAN switches) must use 802.1X protocols to control a port's access to the network. If these ports do not allow partial or guest access, the print server may need to be configured with your 802.1X parameters prior to connection.

To configure initial 802.1X settings before connecting to your network, you can use an isolated LAN, or a direct computer connection using a cross-over cable.

The supported 802.1X authentication protocols and associated configuration depend on the print server model and firmware version. Available configuration settings are listed in Table 4-17 802.1X Configuration Settings.

Table 4-17 802.1X Configuration Settings

Item	Description
Enable Protocols	Enable (check) the supported protocols used for 802.1X authentication on your network. ■ **PEAP**: (Protected Extensible Authentication Protocol). PEAP uses digital certificates for network server authentication and passwords for client authentication. PEAP requires an EAP User Name, EAP Password, and CA Certificate. Dynamic encryption keys are also used. ■ **EAP-TLS**: (Extensible Authentication Protocol using Transport Layer Security, RFC 2716). EAP-TLS is a mutual authentication protocol based on digital certificates for authentication of both the client and the network authentication server. EAP-TLS requires an EAP User Name, Jetdirect certificate and CA certificate. Dynamic encryption keys are also used.
User Name	Specify an EAP/802.1X user name (up to 128 characters maximum) for this device. The default user name is the default host name of the print server, NPIxxxxxx, where xxxxxx are the last six digits of the LAN hardware (MAC) address.
Password, Confirm Password	Specify an EAP/802.1X password (up to 128 characters maximum) for this device. Enter the password again in the Confirm Password field to ensure it was properly entered.
Server ID	Specify the Server ID validation string that identifies and validates the authentication server. The Server ID string is specified on the digital certificate issued by a trusted Certificate Authority (CA) for the authentication server. The entry may be a partial string (right-most characters))unless the **Require Exact Match** checkbox is enabled.

Table 4-17 802.1X Configuration Settings (continued)

Item	Description
Encryption Strength	Specify the minimum encryption strength that can be used during communications with the authentication server. You may select **Low**, **Medium**, or **High** encryption strength. For each encryption strength, ciphers are specified to identify the weakest cipher allowed.
CA Certificate	To validate the authentication server's identity, the authentication server's certificate or a CA (or “Root”) certificate must be installed on the print server. This CA certificate must be issued by the Certificate Authority who signed the authentication server's certificate. To configure or install a CA certificate, click **Configure**.
Authentication Behavior: Reauthenticate on Apply	Enable (check) or disable (clear) this checkbox to control authentication when you click **Apply** on this page, assuming valid configuration entries have been made. **NOTE** This parameter does not apply to security or other configuration wizards. Changes to parameters through a wizard will always cause the print server to reauthenticate. If disabled (default), the print server will not attempt reauthentication unless configuration changes cause the print server to disconnect and reconnect to the network. If enabled, the print server will always try to reauthenticate using the configuration values set.
Restore Defaults	Click this button to restore 802.1X configuration settings to factory default values.

IPsec

Use this page to configure and view the IPsec (Internet Protocol security) policy for the print server. You can enable or disable IPsec operation on the print server, and configure the *default* rule for non-IPsec packets:

- to allow all non-IPsec traffic for which IPsec rules do not apply, or
- to discard (drop) all non-IPsec traffic.

Rules that define the IPsec policy are configured through an IPsec wizard, which is run when you click **Add Rule**. For more information, see IPsec Configuration.

Network Statistics

This page is used to display counter values and other status information currently stored on the HP Jetdirect print server. This information is often useful to diagnose performance and operational problems associated with the network or network device.

Protocol Info

This page provides a list of various network configuration settings on the HP Jetdirect print server for each protocol. Use these lists to validate your desired settings.

Configuration Page

This page provides a view of the HP Jetdirect configuration page that contains a summary of HP Jetdirect status and configuration information. The contents of this page are described in HP Jetdirect Configuration Pages.

Other Links

Help

The **Help** page in the **Networking** tab provides a quick summary of the HP Jetdirect embedded Web server features. In the **Help** page, a link to an HP support document containing updated information is provided (Internet access is required).

Support

The information displayed on the **Support** page depends on the values configured in the Support Info tab in the Other Settings menu. Support information may include the name and telephone number of a Support person, or Web links to Product and Technical Support pages. The default Web links include HP online support and HP product information Web pages (Internet access is required).

HP Home

HP Home provides a link to Hewlett-Packard's home page on the HP Web site (Internet access is required). This link may also be accessed by clicking on the HP logo.

HP Web Jetadmin

HP Web Jetadmin is HP's premier network peripheral management software tool.

A link to HP Web Jetadmin will be displayed only if HP Web Jetadmin has discovered this device through an “Integration URL”. You can then use HP Web Jetadmin to provide enhanced management capabilities for this and other HP Jetdirect-connected devices on your network.

5 IPsec Configuration

HP Jetdirect 635n print servers support Internet Protocol security (IPsec) standards for network-layer security on both IPv4 and IPv6 networks. IPsec (RFC 2401) is relatively complex. But because IPsec provides security at the network layer and can be relatively independent of application layers, the opportunity for secure host-to-host communications over a widespread network, such as the Internet, is greatly enhanced.

NOTE The print server also supports an SNMPv3 agent at the application layer for management application security, and open Secure Sockets Layer (SSL) standards at the transport layer for secure client-server applications (for example, client-server authentication or HTTPS Web browsing).

For IPsec operation on the print server, you must configure an IPsec policy to apply to specified IP traffic. An IPsec policy page is accessed through the embedded Web server and displayed by your Web browser. A typical IPsec policy page is illustrated below.

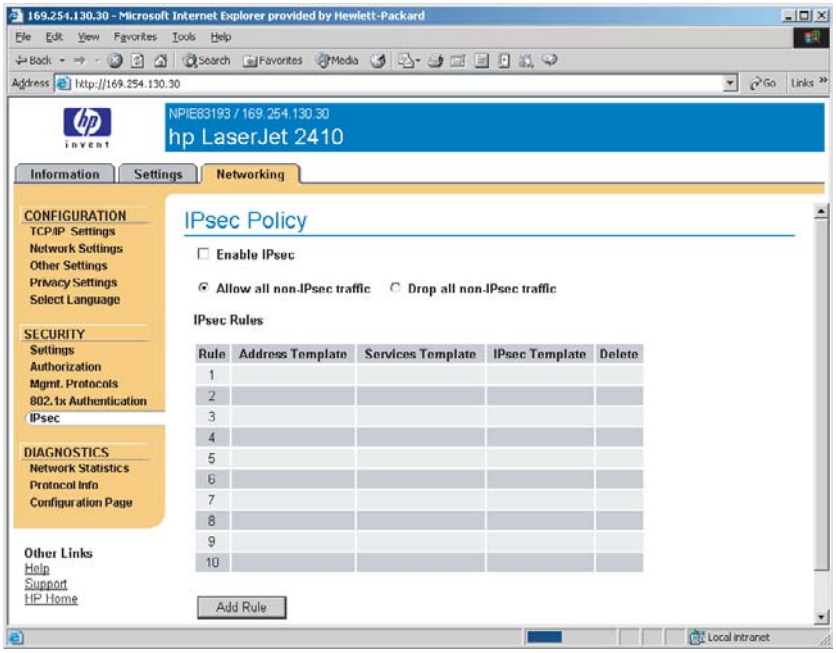


Figure 5-1 IPsec Policy page

The items on this page are described below.

Table 5-1 IPsec Policy page

Item	Description
Enable IPsec	Enter a check mark in the checkbox to enable your IPsec policy. Clear this checkbox to disable IPsec operation.
Allow all non-IPsec traffic Drop all non-IPsec traffic	If IPsec is enabled, select a Default Policy for non-IPsec packets. The default setting is to discard (drop) non-IPsec packets for maximum security. Dropped packets will not be processed. You can choose to allow non-IPsec traffic to be processed as long as a configured IPsec rule is not violated. **Example**: IPsec is enabled on the print server with the following rule: ■ All IPv4 addresses ■ Printing services (Port 9100) ■ A simple IPsec template If **Allow all non-IPsec traffic** is enabled, then: ■ A non-IPsec packet with IPv4 address, directed to printing port 9100, would *not* be processed (dropped) because it violates the configured rule. ■ A non-IPsec packet with IPv4 address to the Telnet port would be allowed and processed. If **Drop all non-IPsec traffic** is enabled, then: ■ A non-IPsec packet with IPv4 address directed to printing port 9100 would *not* be processed (dropped) because it violates the configured rule. ■ An IPsec packet with IPv4 address directed to printing port 9100 would be allowed and processed because it matches the rule. ■ A non-IPsec packet with IPv4 address to the Telnet port would be dropped because of the Default Policy for non-IPsec packets.

Table 5-1 IPsec Policy page (continued)

Item	Description
IPsec Rules	The IPsec policy consists of rules for processing IPsec packets. Up to ten IPsec rules may be configured. Each rule is defined by the following fields: ■ **Address Template**: Identifies the IP addresses for which the rule applies. You may select among several predefined templates, or specify a custom template. Click on an entry to its view configuration settings. ■ **Services Template**: Identifies the services for which the rule applies. You may select among several predefined templates, or specify a custom template. Click on an entry to view its configuration settings. △ **CAUTION** If all services are not specified, a security risk may exist. Future networking applications that are deployed after the IPsec Policy is in place may not be IPsec-protected unless the **All Services** template is used. ■ **IPsec Template**: Identifies the IPsec template for which the rule applies. A custom template must be specified as required for your network. Click on an entry to view configuration settings. ■ **Delete**: Each rule contains a button to delete the rule from the list.
Add Rule	The rules are configured through an IPsec wizard, which is run when you press **Add Rule**.

If a packet is IPsec-protected, there must be an IPsec Security Association (SA) for it. A Security Association defines how an IP packet from one host to another is IPsec-protected. Among many things, it defines the IPsec protocol to use, the authentication and encryption keys, and duration of key use.

An IPsec SA is unidirectional; a host may have an inbound SA and an outbound SA associated with particular IP packet protocols and services, and the IPsec protocol used to protect them.

When properly configured, the IPsec rules define the Security Associations for IP traffic to and from the Jetdirect print server and can ensure all traffic is secure.

HP Jetdirect IPsec Wizard

Use the IPsec wizard to create one or more rules that will be applied to IP traffic under the IPsec policy. Click **Add Rule** to start the IPsec wizard.

The wizard guides you through the configuration of up to ten rules, each rule specifying the host addresses, services, and IPsec authentication/encryption settings to be applied to IP traffic. See the illustration below.

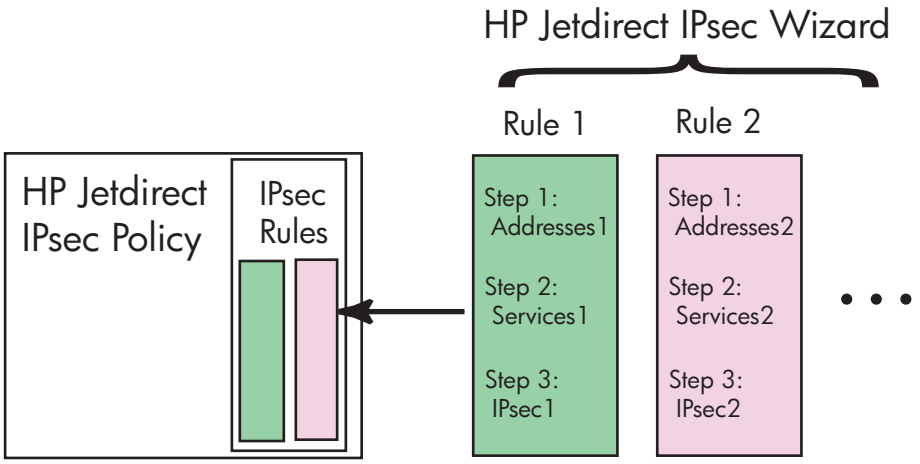


Figure 5-2 Use IPsec Wizard to configure rules

Step 1-Specify an Address Template

The available address templates for which a rule will apply are listed in the **Address Templates** field by name. Select a predefined template, or click **New** to create a custom template using the **Create Address Template** page, decribed below.

To view or delete a template in the list, select it and click **View** or **Delete**.

After an address template has been selected, click **Next**.

Create Address Template

Items on the **Create Address Template** page are described below.

Table 5-2 Create Address Template page

Item	Description
Address Template Name	Enter a name for a custom address policy template in the edit box. This name will be added to the **Step 1-Specify Address Template** page. **NOTE** The address policy template name must be unique for all address policy templates.
Local Address	Select or specify the IP addresses for which this rule will apply.
Remote Address	Local Address: Identifies the addresses associated with the Jetdirect print server. Remote Address: Identifies the addresses associated with remote hosts.

Step 2-Specify Service Template

The available service templates for which a rule will apply are listed in the **Service Templates** field by name. Select a predefined template, or click **New** to create a custom template using the **Create Service Template** page, described below.

CAUTION If all services are not specified, a security risk may exist. Future networking applications that are deployed after the IPsec Policy is in place may not be IPsec-protected unless the **All Services** template is used.

To view or delete a template in the list, select it and click **View** or **Delete**.

After an service template has been selected, click **Next**.

Create Service Template

Items on the **Create Service Template** page are described below.

Table 5-3 Create Service Template page

Item	Description
Service Template Name	Enter a name for a custom service policy template in the edit box. This name will be added to the **Step 2-Specify Service Template** page. **NOTE** The service policy template name must be unique for all service policy templates.
Services	Select one or more services available on the print server for which this template will apply. If a checkmark is entered in a checkbox, the service is selected. If the checkbox is clear, the service is not selected.
Selected Custom Services	This list will contain custom services that will be included with this Service template. To modify this list, click **Selected Services**. A**Select Custom Services** page, described below, will be displayed.
View Service Details	Click this button to view the details of each service selected, such as the protocol and ports used by each service.

Select Custom Services

Use this page to add or remove *custom* services to the Service template. Items on this page are described below.

Table 5-4 Select Custom Services page

Item	Description
Configured Custom Services	The custom services that have already been configured and available are listed. To add another custom service, click the**Add Service** button. This will open the **Add Custom Services** page, described below, that is used to create a custom service. To delete a custom service from the list, select it and click **Delete**.
Selected Services	Custom services on this list will be displayed on the **Create Service Template** page and selected for the Service template. You can add or remove a custom service by selecting a custom service, and clicking **Add** or **Remove** as appropriate.

Add Custom Services

This page allows you to configure a custom service. Items on this page are described below.

Table 5-5 Add Custom Services page

Item	Description
Custom Service Name	Use the edit field to enter a name for the custom service policy. **NOTE** The custom service policy template name must be unique for all custom service policy templates.
Protocol	Select a protocol for this custom service.
Local Ports	Select the ports on the HP Jetdirect print server that this service will use. Depending on the service, select **All Ports**, or select **Port Range** and enter the port range in the edit fields provided.
Remote Ports	Select the ports on the remote hosts that this service will use. Depending on the service, select **All Ports**, or select **Port Range** and enter the port range in the edit fields provided.
Configured Custom Services	This list identifies the custom services that have been configured. Once a custom service has been created, click **Add** to add the service into this list. To remove a service from this list, select it and click **Delete**.

When all the desired services for this template have been specified on the **Create Service Template** page, click **Ok** to add the template on the **Step 2 - Specify Service Template** page. Then click **Next**.

Step 3 - Specify IPsec Template

Any IPsec templates available for a rule will be listed in the **IPsec Templates** field. If none are available, you must click **New** to create a custom template using the **Create IPsec Template** page, decribed below. Because IPsec templates are network dependent, predefined factory-default templates are not included.

To view or delete a listed template, select it and click **View** or **Delete** as appropriate.

After an IPsec template has been configured in the list and selected, click **Next** to complete the rule.

Create IPsec Template

Use this page to create an IPsec template and to specify how Security Associations (SAs) will be created: manually or dynamically. Items on this page are described below.

NOTE Depending on your selection of the authentication type (dynamic keys or manual keys) on this page, subsequent configuration pages will differ when you click **Next**.

Table 5-6 Create IPsec Template page

Item	Description
IPsec Template Name	Enter a name for a custom IPsec template in the edit box. This name will be added to the **Step 3-Specify IPsec Template** page. **NOTE** The IPsec policy template name must be unique for all IPsec policy templates.
Authentication Type	Hosts specified in the Address template must negotiate IPsec security settings during a session. During negotiation, authentication must occur to validate sender/receiver identities. Select one of the following authentication types. **Dynamic Keys**: Use Internet Key Exchange (IKE) protocols for authentication and encryption and to create Security Associations . You must select one of the following methods: ■ **Pre-Shared Key**: Enter a pre-shared key (ASCII string) that is shared by all hosts specified by this rule. If a pre-shared key is used, it should be protected; any host that knows this key may be authenticated. ■ **Certificates**: Certificates may be used for authentication. A self-signed Jetdirect certificate is pre-installed by factory default, and can be replaced. In addition, a CA certificate must be installed for server authentication. For information on requesting, configuring and installing certificates, see Configuring Certificates. After selecting a dynamic key method, you must configure IKE parameters using the **IKEv1 Phase 1 (Authentication)** page. **Manual Keys**: Select this option to configure encryption keys and create Security Associations manually through the **Manual Keys** page.

IKEv1 Phase 1 (Authentication)

Internet Key Exchange (IKE) is used to create Security Associations dynamically. Use this page to configure SA parameters for authentication and to securely generate IPsec session keys for encryption and hashing algorithms. Items on this page are described below.

Table 5-7 IKE Phase 1 (Authentication) page

Item	Description
Diffie-Hellman Groups	(Required) A Diffie-Hellman exchange allows a secret key and security services to be securely exchanged between two hosts over an unprotected network. A Diffie-Hellman group determines the parameters to use during a Diffie-Hellman exchange. Multiple well-known Diffie-Hellman groups are provided and can be selected. Selecting all the groups will result in a single negotiated group.
SA Lifetime	(Required) Specify the lifetime, in seconds, that the keys associated with this Security Association will be valid.
Negotiation Mode	(Required) IKE provides two modes of negotiation during an exchange for keys and security services to be used for a Security Association: Main: This mode features identity protection between the hosts and is slower but secure. Aggressive: This mode uses half the message exchanges. It is faster, but less secure than Main mode.

Table 5-7 IKE Phase 1 (Authentication) page (continued)

Item	Description
Security Methods	(Required) Select the Encryption methods and strengths and Hash methods to be used. Selecting all the methods will result in a single negotiated method.
Perfect Forward Secrecy	When secret keys are periodically replaced, Perfect Forward Secrecy (PFS) indicates that the new keys are independently derived and unrelated to the prior keys. This helps to ensure that data protected by the new keys is secure. While PFS provides additional security, it requires additional processing overhead. If PFS is desired, enable the following: Identity Perfect Forward Secrecy (Master PFS): Enables PFS for identity protection. Key Perfect Forward Secrecy (Session PFS): Enables PFS for key protection. Diffie-Hellman Groups: (For Session PFS only) Select one or more Diffie-Hellman groups to use during the key exchange.
Replay detection	IPsec protocols support anti-replay services. Enable or disable the IPsec anti-replay algorithm.
IKE Retries	Specify the number of times that IKE protocols are to be retried if a failure occurs. Enter a value from 0 to 20.
IKE Retransmit Interval	Specify the time (in seconds) between successive IKE protocol retries if a failure occurs. Enter a value from 0 to 5.

IPsec Protocols

After authentication, this page is used to specify IPsec protocols and associated encryption to use for Security Associations in this rule.

Item	Description
ESP	Use IPsec Encapsulating Security Payload (ESP) protocol for IP packets. ESP headers are inserted in packets to ensure privacy and integrity of packet contents. Select among the supported encryption methods/strengths and Hash methods to be used for data protection.
AH	Use IPsec Authentication Header (AH) protocol for IP packets. AH headers are inserted in packets to protect integrity of packet contents through cryptographic checksums. Select among the supported Hash methods. **CAUTION** The use of IPsec AH may not function properly in environments that use Network Address Translation (NAT).
Encapsulation Type	Specify how the IPsec protocols selected (ESP or AH) will be encapsulated: ■ Transport: Only the user data in each IP packet is protected, the IP packet header is not protected. ■ Tunnel: All packet fields are protected, including the IP packet header.
SA Lifetime	Specify the Security Association lifetime, either in seconds or in the number of Kbytes. Within the limits specified, shorter lifetimes will provide improved security depending on the frequency of SA use.

Manual Keys

Use this page to configure encryption keys and Security Associations manually. Because the applicable hosts will also be manually configured, authentication and dynamic key generation are not needed. Items on this page are described below.

Table 5-8 Manual Keys page

Item	Description
ESP SPI (256 to 4095 ASCII)	If ESP is enabled on the **IPsec Protocols** page, the ESP SPI (Security Parameters Index) fields are provided. The ESP SPI is a 32-bit field in an ESP header that helps to identify the IPsec Security Association (SA). in: Enter a value for an SA used for received packets. out: Enter a value for an SA used for transmitted packets from the print server.
AH SPI (256 to 4095 ASCII)	If AH is enabled on the **IPsec Protocols** page, the AH Security Parameters Index (SPI) edit fields are provided. An AH SPI is a 32-bit field in an Authentication header that helps to identify the IPsec SA. in: Enter a value for an SA used for received packets. out: Enter a value for an SA used for transmitted packets from the print server. **CAUTION** The use of IPsec AH may not function properly in environments that use Network Address Translation (NAT).
Key Format	Choose whether you will use Hexadecimal values or ASCII characters to specify Encryption or Hash entries.
Encryption	Enter the Encryption keys for packets received (in) or sent (out) by the print server.
Hash	Enter the Hash keys for packets received (in) or sent (out) by the print server. The Hash keys must be the same for ESP and AH protocols if both are enabled.

Summary

This page provides summary information for the IPsec rule. Click **Create Another Rule** to define another IPsec rule before returning to the **IPsec Policy** page. Or, click **Finish** to add all configured rules to the **IPsec Policy** page.

Configuring Windows Systems

To configure IPsec on supported Windows systems, consult your system documentation, or search for IPsec on the Microsoft Web site.

6 Security Features

Security features are provided that can help to minimize unauthorized access to network configuration parameters and other data stored on HP Jetdirect print servers. The features may differ depending on the version of firmware resident on the print server.

CAUTION Although these features can help to minimize unauthorized access to stored data and configuration parameters on HP Jetdirect print servers, the prevention of unauthorized access cannot be guaranteed.

For advanced security needs, contact HP Consulting services.

The following table summarizes the basic security features provided with HP Jetdirect print servers.

Table 6-1 Summary of HP Jetdirect Security Features

Secure Embedded Web Server Management
■ A pre-installed, self-signed digital certificate provides HTTPS (secure HTTP) access to the embedded Web server from your Web browser. HTTPS (secure HTTP) provides secure, encrypted communications with your browser. ■ Digital certificates issued by a trusted third party can be installed on the print server, allowing it to be configured as a trusted site. ■ Using HTTPS, the embedded Web server provides configuration and management of network parameters and protocols through a secure channel. ■ An HP Jetdirect Security Configuration Wizard provides an easy-to-use interface to configure security settings. ■ Full-featured print servers can be configured with EAP/802.1X server-based authentication.
IPsec
■ The 635n print server supports Internet Protocol security (IPsec) over IPv4 and IPv6. When used with IPv6 hosts, IPsec provides the potential for true end-to-end security (confidentiality, data integrity, authentication, and anti-replay protection) over a network.
Network Protocol Control
■ Network printing, printing services, device discovery, and management protocols on the HP Jetdirect print server can be enabled or disabled. By disabling unused or unnecessary protocols, unauthorized access through applications that use these protocols can be prevented. ■ Protocols may be enabled or disabled through Telnet (IPv4), embedded Web server, and HP Web Jetadmin (IPv4).
IP Administrator Password

Table 6-1 Summary of HP Jetdirect Security Features (continued)

- Used by Telnet (IPv4), HP Web Jetadmin (IPv4), and the embedded Web server to control access to HP Jetdirect configuration parameters.
- Up to 16 alphanumeric characters may be used.
- Configured on the HP Jetdirect print server using TFTP (IPv4), Telnet (IPv4), embedded Web server services, or HP Web Jetadmin (IPv4). Up to 16 alphanumeric characters are allowed.
- If configured through the embedded Web server, may be synchronized as the SNMP Set Community Name used in HP Web Jetadmin (IPv4) SNMP v1/v2c Set commands.
- Cleared by cold reset of the print server to factory default settings.

IPv4 Access Control List

- Specifies up to 10 IPv4 host systems, or IPv4 networks of host systems, that are allowed access to the HP Jetdirect print server and the attached network device.
- Access is generally limited to host systems specified in the list.
- By factory default, host systems that use HTTP (for example, using the embedded Web server or IPP) are not checked against entries in the Access List and are allowed access. However, HTTP host access can be disabled through the embedded Web server.
- If the list is empty, then all hosts are allowed access.
- Configured on the HP Jetdirect print server using TFTP (IPv4), Telnet (IPv4), embedded Web server, or SNMP (IPv4) management software.

Telnet Control

- Telnet (IPv4) access is not secure. Telnet may be disabled through the embedded Web server (see HP Jetdirect Embedded Web Server (V.31.xx)).

Authentication and Encryption

(Full-featured print servers) Certificate management for X.509 digital certificates is provided through the embedded Web server, for both client-based and server-based authentication. A self-signed Jetdirect certificate is pre-installed, and may be replaced. A Certificate Authority (CA) certificate may also be installed.

IPv4 SNMP v1/v2c Set Community Name (IP/IPX)

(IPv4 SNMP v1/v2c only)

- A password on the HP Jetdirect print server that allows incoming SNMP Set commands (for example, from management software) to write (or *set*) HP Jetdirect configuration parameters.
- For a user-assigned Set Community Name, SNMP Set commands must contain the user-assigned name, which is authenticated by the print server before the command is performed.
- On IP networks, authentication of SNMP Set commands may be further restricted to systems identified on the access control list.
- Configured on the HP Jetdirect print server using TFTP (IPv4), Telnet (IPv4), embedded Web server, or Management application services.
- SNMP v1/v2c uses plain text and can be disabled.

IPv4 SNMP v3

Table 6-1 Summary of HP Jetdirect Security Features (continued)

(For full-featured print servers only)

- An SNMP v3 agent on the HP Jetdirect print server provides secure, encrypted communications with an SNMP v3 management application, such as HP Web Jetadmin.
- The print server supports creation of an SNMP v3 account when it is enabled through the embedded Web server. The account information can be integrated on SNMP v3 management applications.
- The print server supports seamless SNMP v3 account creation and management from HP Web Jetadmin.

HP Web Jetadmin (IPv4) Password and Profiles

- Access control to Jetdirect configuration parameters through the Jetdirect IP Administrator password, which may be configured from HP Web Jetadmin (IPv4), Telnet (IPv4), or embedded Web server. For instructions, refer to the HP Web Jetadmin online help.
- HP Web Jetadmin provides access control through User Profiles. User Profiles allow password protection for individual profiles and controlled access to HP Jetdirect and printer features. For more information, refer to the HP Web Jetadmin online help.
- (For full-featured print servers only) HP Web Jetadmin can seamlessly enable the IPv4 SNMP v3 agent on the print server, and create an SNMP v3 account for secure, encrypted management.

Printer Control Panel Lock

- Selected HP printers provide a control panel lock that prevents access to HP Jetdirect internal print server configuration parameters. In many cases, this lock may be set remotely by management applications (such as HP Web Jetadmin). To determine whether your printer supports a control panel lock, refer to your printer documentation.

Configuration Precedence Table

- To control the configuration of various TCP/IP parameters using the different tools supported by the print server, a Configuration Methods precedence table is provided. The precedence table is accessed through the embedded Web server interface. By default, manual configuration methods have precedence over other methods (such as DHCP or TFTP). By changing the precedence order, the control of configuration parameters may be enhanced.

Using Security Features

Access to HP Jetdirect configuration parameters can be controlled through combined use of the available security features. Table 6-2 Settings for Access Control provides examples of various settings and the associated level of access control.

Table 6-2 Settings for Access Control

Settings	Level of Access Control
■ Accessible through HTTP (embedded Web server), SNMP v1/v2c applications, or Telnet ■ Administrator password not set ■ Default SNMP v1/v2c community names used ■ No authentication or encryption ■ Access control list empty	**Low** Best suited for trusted environments. Any system can access the HP Jetdirect configuration parameters through the embedded Web server, Telnet, or SNMP management software. Passwords are not required.
■ Administrator password set ■ User-specified SNMP v1/v2 Set Community Name set ■ The Access Control List contains host entries and checks HTTP connections ■ Telnet and other non-secure protocols disabled.	**Medium** Limited security for non-trusted environment. If the Administrator password and SNMP v1/v2c Set Community Name are known, access is limited to: ■ systems listed in the Access Control List, and ■ SNMP v1/v2c management applications
■ Unused protocols disabled ■ HTTPS access enabled using certificates issued by trusted sources ■ Full-featured Jetdirect print servers configured for EAP/802.1x server-based authentication and encryption ■ Full-featured Jetdirect print servers with SNMP v3 enabled, SNMP v1/v2c disabled ■ Telnet disabled ■ Passwords set ■ The Access Control List contains specified entries and HTTP connections are checked ■ Printer control panel locked ■ IPsec is enabled and configured for use.	**High** High security for non-trusted, professionally managed environments. Access is limited to authenticated hosts that are specified in the Access Control List. Encryption provides data privacy; network communication in plain-text is not used. **CAUTION** Power-on settings (for example, configurations from a BootP/TFTP or DHCP/TFTP server) may change the print server's settings when it is power-cycled. Be sure to confirm your intended power-on settings.

7 Troubleshooting the HP Jetdirect Print Server

This chapter describes how to diagnose and correct problems associated with the HP Jetdirect print server.

A flowchart guides you to the correct procedures for troubleshooting the following:

- Printer problems
- HP Jetdirect hardware installation and connection problems
- Network-related problems

To troubleshoot your HP Jetdirect print server, you may need the following items:

- A Jetdirect configuration page (see HP Jetdirect Configuration Pages)
- A Printer Configuration or Diagnostic Page
- Documentation that came with your printer
- Documentation that came with your HP Jetdirect print server
- The diagnostics tools and utilities provided with your network software (for example, Novell NetWare utilities, TCP/IP utilities, or network printer management applications such as HP Web Jetadmin)

NOTE Frequently asked questions about installing and configuring HP Jetdirect print servers can be found by searching for your HP Jetdirect product at http://www.hp.com/support/net_printing.

Resetting to Factory Defaults

Parameters on the HP Jetdirect print server (for example, the IP address) can be reset to factory default values using the following procedures:

CAUTION A Jetdirect X.509 certificate will be saved over a cold reset to factory default values. However, a Certificate Authority (CA) certificate installed to validate a network authentication server will not be saved.

- **HP LaserJet Printer with Internal EIO Print Server**

  In most cases, the HP Jetdirect internal print server can be reset to factory defaults when a cold-reset is performed on the printer.

  CAUTION Be sure to print a Jetdirect configuration page before performing a cold reset. Resetting the printer will clear all data from the printer memory and reset all printer settings, including network configurations, to their factory default values. After a cold reset, users may be affected due to changes in user-specified printer settings. Network systems may lose their connection to the printer.

  NOTE The **Restore Factory Settings** menu item in the printer control panel menu will not reset the HP Jetdirect print server.

  - For older HP LaserJet printers, a cold-reset is performed by power cycling the printer while pressing the **Go**, **Start**, or **Pause/Resume** button.
  - For recent LaserJet printers and MFPs, use the printer's Service menu accessed during the initial power-on sequence. See Service Menu Example.
  - For other printers, refer to your printer manuals. Or, visit http://www.hp.com/go/support and search for document file bpj02300.html.

  NOTE After a cold reset, print a Jetdirect configuration page to confirm that factory-reset values have been assigned.

Service Menu Example

To perform a cold reset on many recent HP LaserJet printers and MFPs:

1. Turn the printer on and watch for the memory count to begin.
2. Press and hold the **Select** ✓ button (or the “6” button on MFPs with numeric keypads only) until the three control panel lights (**Ready**, **Data**, **Attention**) blink and then remain on.
3. Release the **Select** ✓ button (or “6” button). The control panel will display **Select Language**.
4. Press the down arrow ▼ button (or “9” button) until **Cold Reset** appears.
5. Press the **Select** ✓ button (or “6” button) to perform a cold reset and then continue its power-on sequence.

General Troubleshooting

Troubleshooting Chart - Assessing the Problem

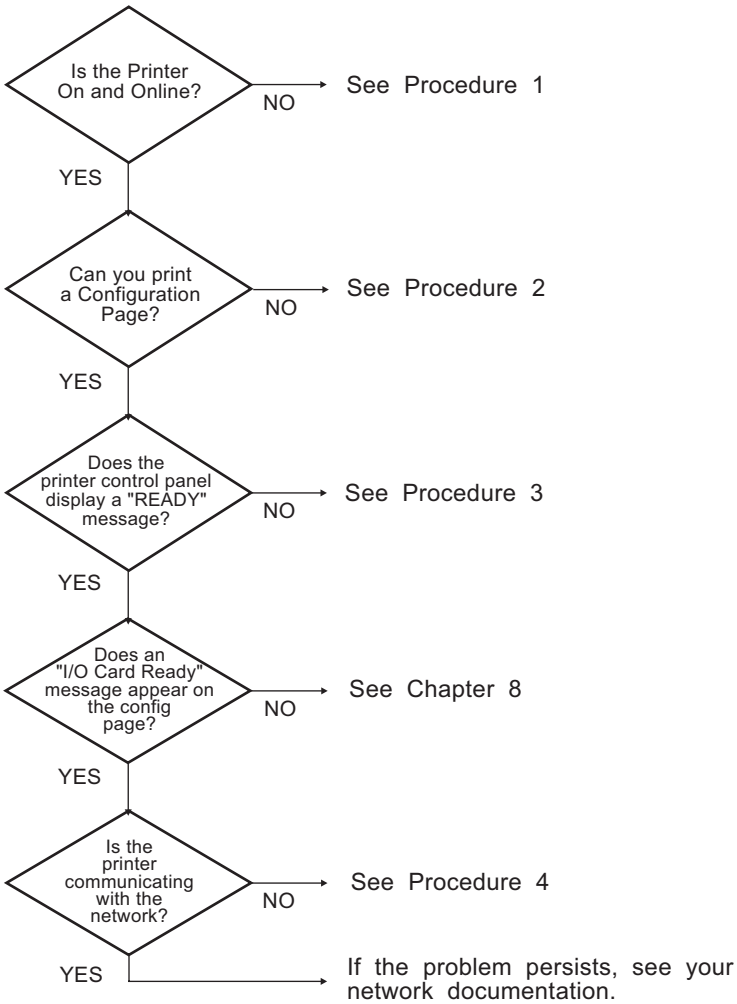


Figure 7-1 Assessing the Problem

Procedure 1: Verifying that the Printer is On and Online

Check the following items to make sure the printer is ready to print.

1 Is the printer plugged in and turned on?

Make sure the printer is plugged in and turned on. If the problem persists, you may have a defective power cable, power source, or printer.

2 Is the printer online?

The online **Ready** light should be lit. If it is not, press the appropriate buttons (for example, **Start**, **Pause/Resume**, or press ✓ to access the menus) to place the printer online.

3 Is the printer's control panel display blank (on printers with displays)?

- Make sure the printer is turned on.
- Make sure the HP Jetdirect print server is installed correctly.
- Make sure the printer is not in Power Save mode.

4 Does a message other than **READY** appear on the printer control panel display?

- See Procedure 3 in this section for a list of network-related error messages and corrective actions.
- See your printer documentation for a complete list of control panel messages and corrective actions.

Procedure 2: Printing an HP Jetdirect Configuration Page

The HP Jetdirect configuration page is an important troubleshooting tool. The information on this page reveals the status of your network and the HP Jetdirect print server. The ability to print a configuration page provides an indication that the printer is operating correctly. See HP Jetdirect Configuration Pages for information on the HP Jetdirect configuration page.

NOTE For a TCP/IP network, the Jetdirect configuration page can also be viewed from a browser by accessing the Jetdirect embedded Web server. See HP Jetdirect Embedded Web Server (V.31.xx) for more information.

Check the following items if the configuration page does not print.

1. Did you perform the correct steps on the printer to print the configuration page?

   The steps required to print a configuration page vary between different printers and print servers. See the documentation supplied with your print server.

   For EIO print servers, a Jetdirect page typically prints along with the printer configuration page. Use the printer control panel menus.

2. Is there a print job in process?

   You cannot print an HP Jetdirect configuration page to the printer while a print job is in process. Wait until the print job is complete, then print the configuration page.

3. Does an error message appear on the printer control panel display?

   - See Procedure 3 in this section for a list of network-related error messages and corrective actions.
   - See your printer documentation for a complete list of control panel messages and corrective actions.

Procedure 3: Resolving Printer Display Error Messages

Check the following information to resolve network-related error messages that appear on the printer control panel display. *This information assumes you have already printed a configuration page*.

1. For LaserJet printers or MFPs, does the control panel display a Service Error message, such as 49.XXXX, 79.XXXX or 8X.XXXX error?

   - Refer to your printer manuals to interpret the error message.
   - If you upgraded the Jetdirect firmware recently, power the print server off/on. For internal Jetdirect cards, turn the printer off and back on again.
   - Reinstall the HP Jetdirect print server to ensure it is installed correctly, and verify all connectors are fully mated.
   - If possible, print an HP Jetdirect configuration page and verify all configuration parameters. To interpret HP Jetdirect configuration page messages, see HP Jetdirect Configuration Pages.
   - If your printer contains multiple EIO slots, try using a different slot.
   - Turn off the printer, remove the HP Jetdirect print server, and turn the printer back on. If the error message disappears when the print server is removed, it is likely that the print server was causing the error. Replace the print server.
   - Record all error codes and contact your service provider. If you need to replace the HP Jetdirect print server under warranty service, include all diagnostic and configuration pages with the faulty print server.

2. Does **EIOX INITIALIZING/DO NOT POWER OFF** appear on the display?

   Wait for ten minutes to see if it clears. If it does not, you may need to replace the HP Jetdirect print server.

3 Does a **40 ERROR** appear on the printer's control panel display?

The HP Jetdirect print server detected a break in the data communications. When this error occurs, the printer goes offline.

A break in communications may result from the physical network connection being disrupted or the server going down. If your printer has an Auto Continue feature that is disabled or off, you must press the appropriate key (**Start** or **Pause/Resume**, for example) on the printer after the communications problem is solved to put the printer back online. Turning the Auto Continue feature on forces the printer to reconnect without user intervention. However, this does not solve the disconnect problem.

4 Does an initializing (**INIT**) message appear on the display?

This is a normal message. Wait about 3 minutes for the message to clear, or another message to appear. If another message appears, see the printer's documentation and configuration pages for additional information.

5 Does a message other than **READY** or the messages listed in this section appear on the display?

See your printer documentation for a complete list of control panel messages and corrective actions.

Procedure 4: Resolving Printer Communication Problems with the Network

Check the following items to verify that the printer is communicating with the network. *This information assumes you have already printed a Jetdirect configuration page*.

1 Are there any physical connection problems between the workstation or file server and the HP Jetdirect print server?

Verify network cabling, connections, and router configurations. Verify that network cable lengths meet network specifications.

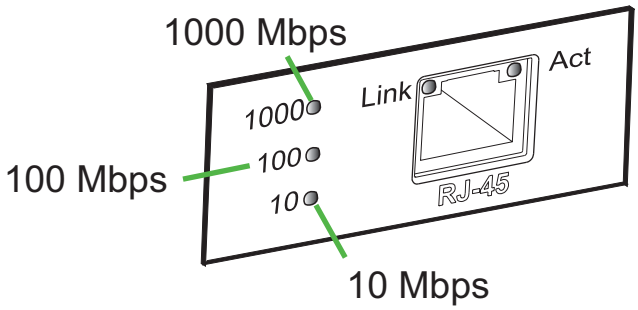
2 Are your network cables connected properly?

Make sure that the printer is attached to the network using the appropriate HP Jetdirect print server port and cable. Check each cable connection to make sure it is secure and in the right place. If the problem continues, try a different cable or network port on the hub or switch.

3 For 10/100/1000Base-T print servers, is auto-negotiation properly configured? For EIO print servers, auto-negotiation may be configured through the EIO Jetdirect menu using the printer's control panel. Auto-negotiation is the factory default setting.

For proper operation, the link speed and communication mode on the print server must match the network.

Depending on the print server model, indicator lights are provided to identify the link speed being used. Verify that either the 10 Mbps, 100 Mbps, or 1000 Mbps link speed light is on. If all link indicators are off, then a proper link has not been established.



4 Is the print server connected to an 802.1X network and properly configured for EAP/802.1X operation?

The network must support the Extensible Authentication Protocol (EAP) method configured for use on the print server.

Verify the configuration of the network's 802.1X port. If it does not allow guest or temporary access, you may need to preconfigure the Jetdirect print server for 802.1X operation before connection to your network. This is done using an isolated LAN, or through a direct computer-to-printer connection using a cross-over cable.

5 Have any software applications been added to the network?

Make sure they are compatible and that they are installed correctly with the correct printer drivers.

6 Are other users able to print?

The problem may be workstation-specific. Check the workstation network drivers, printer drivers, and redirection (capture in Novell NetWare).

7 If other users are able to print, are they using the same network operating system?

Check your system for proper network operating system setup.

8 Is your protocol enabled on the HP Jetdirect print server?

Check the status of the network protocols on the Jetdirect configuration page. See HP Jetdirect Configuration Pages for information on the configuration page. (On TCP/IP networks, you can also use the embedded Web server to check status of other protocols. See HP Jetdirect Embedded Web Server (V.31.xx))

9 Is there an error message in the protocol's section on the Jetdirect configuration page?

See HP Jetdirect Configuration Pages for a list of error messages.

10 If you are using Apple EtherTalk, does the printer appear in the Chooser?

- Verify network and HP Jetdirect settings on the Jetdirect configuration page. See HP Jetdirect Configuration Pages for information on the configuration page.
- Confirm the network settings for the printer using the printer control panel (for printers with control panels).
- See the troubleshooting section in the online help for the HP LaserJet Utility.
- Verify the printer has the PostScript option installed.

11 If you are on a TCP/IP network, can you use Telnet to print directly to the printer?

Use the following Telnet command:

```
telnet <IP address> <port>
```

where <IP address> is the IP address assigned to the HP Jetdirect print server and <port> is 9100, the default printing port of the print server.

In the Telnet session, type in data and press Enter. The data should print to the printer (a manual form feed may be required).

12 Does the printer appear in HP Web Jetadmin or other management application?

- Verify network and HP Jetdirect settings on the Jetdirect configuration page. See HP Jetdirect Configuration Pages for information on the configuration page.
- Confirm the network settings for the printer using the printer control panel (for printers with control panels).
- See the troubleshooting section in the online help included with the HP Web Jetadmin software.

13 If you are using Microsoft Windows NT 4.0 (DLC/LLC), does the printer appear in the **Add a Hewlett-Packard Network Peripheral Port** dialog box?

- Verify network and HP Jetdirect settings on the Jetdirect configuration page. See HP Jetdirect Configuration Pages for information on the configuration page.
- Confirm the network settings for the printer using the printer control panel (for printers with control panels).
- Ensure that the printer is on the same physical subnet and that it is not connected over a router.

14 On supported systems, does the printer respond to HP Web Jetadmin?

- Verify network and HP Jetdirect settings on the Jetdirect configuration page. See HP Jetdirect Configuration Pages for information on the configuration page.
- Confirm the network settings for the printer using the printer control panel (for printers with control panels).
- See the troubleshooting section in the online help included with the HP Web Jetadmin software.

8 HP Jetdirect Configuration Pages

HP Jetdirect configuration pages are important tools for managing or troubleshooting HP Jetdirect print servers.

The standard HP Jetdirect Configuration page provides identification information (such as the HP Jetdirect model, firmware version, and LAN hardware address), as well as status and configuration parameters of supported network protocols. Network statistics gathered by the print server are also provided. See HP Jetdirect Configuration Page.

For HP Enhanced I/O (EIO) printers with an HP Jetdirect EIO print server installed, a Jetdirect configuration page will automatically print after a printer configuration page is printed. For instructions, see your printer manuals.

An HP Jetdirect configuration page can also be viewed over the network from a management utility (such as HP Web Jetadmin), or by accessing the embedded Web server on the HP Jetdirect print server (see HP Jetdirect Embedded Web Server (V.31.xx)).

If supported by the print server (such as 635n), a Security configuration page provides IPsec status along with general security settings. The Security configuration page is printed from the Jetdirect menu access through the printer control panel. See Security Configuration Page.

HP Jetdirect configuration pages may be printed directly on the attached printer. The format of the pages depend on:

- the printer model
- the HP Jetdirect model and firmware version

HP Jetdirect Configuration Page

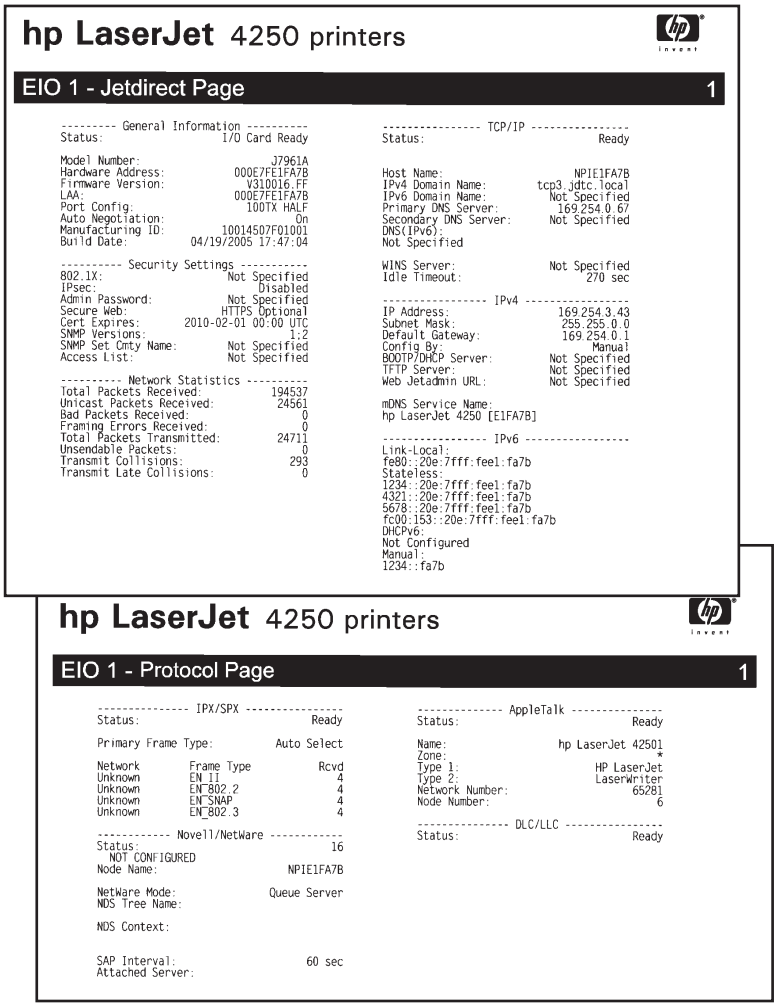
The standard HP Jetdirect configuration page provides overall status and configuration settings on the print server.

Status Field Error Messages

The HP Jetdirect configuration page contains several status fields for the print server and the supported protocols. One or more error codes and related error messages may be displayed in a Status field. For information on each error message, see Table 8-12 Error Messages.

Configuration Page Format

A typical Jetdirect configuration page is illustrated in Figure 8-1 Typical Jetdirect Configuration Page. The configuration page information provided will vary depending on the print server model and firmware version.



hp LaserJet 4250 printers

EIO 1 - Jetdirect Page 1

```
--------- General Information ----------
Status:                      I/O Card Ready

Model Number:                       J7961A
Hardware Address:             000E7FE1FA7B
Firmware Version:                V310016_FF
LAA:                          000E7FE1FA7B
Port Config:                     10DTX HALF
Auto Negotiation:                        On
Manufacturing ID:             10014507F01001
Build Date:           04/19/2005 17:47:04

---------- Security Settings ----------
802.1X:                      Not Specified
IPsec:                            Disabled
Admin Password:              Not Specified
Secure Web:                  HTTPS Optional
Cert Expires:         2010-02-01 00:00 UTC
SNMP Versions:                         1:2
SNMP Set Cmty Name:          Not Specified
Access List:                 Not Specified

---------- Network Statistics ----------
Total Packets Received:              194537
Unicast Packets Received:             24561
Bad Packets Received:                     0
Framing Errors Received:                  0
Total Packets Transmitted:            24711
Unsendable Packets:                       0
Transmit Collisions:                    293
Transmit Late Collisions:                 0

---------- TCP/IP ----------
Status:                                Ready

Host Name:                        NPIE1FA7B
IPv4 Domain Name:          tcp3.jdtc.local
IPv6 Domain Name:              Not Specified
Primary DNS Server:          169.254.0.67
Secondary DNS Server:        Not Specified
DNS(IPv6):
Not Specified

WINS Server:                 Not Specified
Idle Timeout:                        270 sec

---------- IPv4 ----------
IP Address:                  169.254.3.43
Subnet Mask:                   255.255.0.0
Default Gateway:               169.254.0.1
Config By:                          Manual
BOOTP/DHCP Server:           Not Specified
TFTP Server:                 Not Specified
Web Jetadmin URL:            Not Specified

mDNS Service Name:
hp LaserJet 4250 [E1FA7B]

---------- IPv6 ----------
Link-Local:
fe80::20e:7fff:fee1:fa7b
Stateless:
1234::20e:7fff:fee1:fa7b
4321::20e:7fff:fee1:fa7b
5678::20e:7fff:fee1:fa7b
fc00:153::20e:7fff:fee1:fa7b
DHCPv6:
Not Configured
Manual:
1234::fa7b
```

hp LaserJet 4250 printers

EIO 1 - Protocol Page 1

```
---------- IPX/SPX ----------
Status:                                Ready

Primary Frame Type:              Auto Select

Network         Frame Type             Rcvd
Unknown         EN_II                     4
Unknown         EN_802.2                  4
Unknown         EN_SNAP                   4
Unknown         EN_802.3                  4

---------- Novell/NetWare ----------
Status:                                  16
  NOT CONFIGURED
Node Name:                        NPIE1FA7B

NetWare Mode:                Queue Server
NDS Tree Name:

NDS Context:


SAP Interval:                        60 sec
Attached Server:

---------- AppleTalk ----------
Status:                                Ready

Name:                     hp LaserJet 42501
Zone:                                     *
Type 1:                          HP LaserJet
Type 2:                          LaserWriter
Network Number:                       65281
Node Number:                              6

---------- DLC/LLC ----------
Status:                                Ready
```

Figure 8-1 Typical Jetdirect Configuration Page

The Jetdirect configuration page is divided into sections, as identified in the following table. For each section, the detailed parameter descriptions and settings, including error messages, are provided in the remainder of this chapter.

Table 8-1 Configuration Page sections

Section Name	Description
HP Jetdirect Configuration or General Information	Identifies the HP Jetdirect print server and provides general status. For information on items in this section, see Table 8-2 HP Jetdirect Configuration. (For error messages, see Table 8-12 Error Messages.)
Security Settings	Provides the current status of configuration and access security parameters. See Table 8-3 Security Settings. In addition, an enhanced security page can be printed from the Jetdirect menu accessed through the printer control panel. See Security Configuration Page.
Network Statistics	(HP Jetdirect wired print servers only) Provides the current values for various network parameters monitored by the HP Jetdirect print server. See Table 8-4 Network Statistics.
TCP/IP IPv4 IPv6	Provides the current status and parameter values for TCP/IP network protocols. For general information, see Table 8-5 TCP/IP Configuration Information. For IPv4, see Table 8-6 IPv4 Section. For IPv6, see Table 8-7 IPv6 Section. (For error messages, see Table 8-12 Error Messages.)
IPX/SPX	Provides the current status and parameter values for the IPX/SPX network protocols. See Table 8-8 IPX/SPX Configuration Information. (For error messages, see Table 8-12 Error Messages.)
Novell/NetWare	Provides the current status and parameter values for a Novell NetWare network. See Table 8-9 Novell NetWare Configuration Information. (For error messages, see Table 8-12 Error Messages.)
AppleTalk	(Ethernet Only) Provides the current status and parameter values for the AppleTalk network protocols. See Table 8-10 AppleTalk Configuration Information. (For error messages, see Table 8-12 Error Messages.)
DLC/LLC	Provides the current status and parameter values for the DLC/LLC network protocols. See Table 8-11 DLC/LLC Configuration Information. (For error messages, see Table 8-12 Error Messages.)

Configuration Page Messages

HP Jetdirect Configuration/General Information

Information in this section provides general HP Jetdirect print server configuration as described in Table 8-2 HP Jetdirect Configuration. For error messages, see Table 8-12 Error Messages.

Table 8-2 HP Jetdirect Configuration

Message	Description
STATUS:	Current state of the HP Jetdirect print server. I/O CARD READY, or READY: The HP Jetdirect print server has successfully connected to the network and is awaiting data.

Table 8-2 HP Jetdirect Configuration (continued)

Message	Description
	I/O CARD INITIALIZING, or INITIALIZING: The HP Jetdirect print server is initializing the network protocols. For more information, see the status line for each protocol on the configuration page. I/O CARD NOT READY, or ERROR: There is a problem with the print server or its configuration. An error code and message is displayed if the print server is not ready. For more information, see Table 8-12 Error Messages.
MODEL NUMBER:	The model number of the HP Jetdirect print server (for example, J7961A)
HARDWARE ADDRESS:	The 12-digit hexadecimal network hardware (MAC) address of the HP Jetdirect print server installed in the printer or device. This address is assigned by the manufacturer.
FIRMWARE VERSION:	The firmware revision number of the HP Jetdirect print server currently installed in the printer.
LAA	The Locally Administered Address (LAA) identifies the user-specified LAN hardware address of a print server, which may be required by some network adiministrators. The default address is the print server's factory-default LAN hardware address.
PORT CONFIG:	Identifies the link configuration of the RJ-45 port on the HP Jetdirect wired Ethernet print server: 10BASE-T HALF: 10 Mbps, half-duplex 10BASE-T FULL: 10 Mbps, full-duplex 100TX HALF: 100Mbps, half-duplex 100TX-FULL: 100Mbps, full-duplex 1000T-FULL: 1000 Mbps, full-duplex UNKNOWN: The print server is in an initialization state. DISCONNECTED: A network connection has not been detected. Check network cables.
AUTO NEGOTIATION	Identifies whether IEEE 802.3u Auto-negotiation on the HP Jetdirect 10/100/1000–T port is enabled (ON) or disabled (OFF). ON (default): The HP Jetdirect print server will attempt to automatically configure itself onto the network at the proper speed (10, 100, 1000 Mbps) and mode (half or full duplex). Auto-negotiation is enabled after a cold reset. OFF: You must manually configure the speed and mode using the EIO menu from the printer's control panel. If Auto-negotiation is off, the settings must match those of the network for proper operation.
MANUFACTURING ID:	The manufacturing identification code for use by HP online support personnel.
S/N:	The serial number of the HP Jetdirect print server.
DATE MANUFACTURED:	Identifies the date of manufacture of the HP Jetdirect print server.

Security Settings

Information in this section of the Jetdirect configuration page is described in Table 8-3 Security Settings.

Table 8-3 Security Settings

Message	Description
802.1X	Identifies whether the print server has been configured with EAP/802.1X client authentication settings. Specified: 802.1X authentication has been configured. Not Specified: 802.1X authentication has not been configured.
IPsec:	Provides the print server's current IPsec status. Enabled: IPsec is enabled and operating as configured by the user. Disabled: IPsec is turned off. Policy Failed: The print server failed to implement the IPsec policy that was configured. You may need to reset security (through the control panel or embedded Web server), or perform a cold-reset of the print server.
Admin Password:	Specifies whether an IP Administrator password has been configured on the print server. This password is shared by Telnet, the embedded Web server, and HP Web Jetadmin to control access to print server configuration parameters. Up to 16 case-sensitive, alphanumeric characters can be used. Not Specified: An Administrator password has not been set. Set: An Administrator password has been set. (The password may be cleared from the print server through a cold reset.)
Cert Expires:	Specifies the expiration date of the digital certificate for SSL/TLS encrypted security. The date is in UTC format (for example, “2002-10-02 12:45 UTC”). Not Applicable: Displayed if a digital certificate has not been installed.
SNMP Versions:	Specifies the SNMP versions enabled on the print server. Disabled: All SNMP versions are disabled on the print server. No SNMP access is allowed. 1;2: SNMP v.1 and SNMP v.2c are supported, and SNMP v.3 is disabled, or not supported. 1;2;3-na/np: SNMP v.1, v.2c, and v.3 are enabled. v.3 is enabled with the minimum security of no authentication (“na”) and no privacy (“np”). 1;2;3-a/np: SNMP v.1, v.2c, and v.3 are enabled. v.3 is enabled with the minimum security of authentication enabled (“a”) but no privacy (“np”). 1;2;3-a/p: SNMP v.1, v.2c, and v.3 are enabled. v.3 is enabled with the minimum security of authentication (“a”) with privacy (“p”) enabled. 3-na/np: SNMP v.1 and v.2c are disabled. SNMP v.3 is enabled with the minimum security of no authentication (“na”) and no privacy (“np”). 3-a/np: SNMP v.1 and v.2c are disabled. SNMP v.3 is enabled with the minimum security of authentication enabled (“a”) but no privacy (“np”). 3-a/p: SNMP v.1 and v.2c are disabled. SNMP v.3 is enabled with the minimum security of authentication (“a”) with privacy (“p”) enabled.
SNMP Set Cmty Name:	Specifies whether an SNMP set community name has been configured on the HP Jetdirect print server. An SNMP set community name is a password for write access to SNMP control functions (SNMP SetRequests) on the HP Jetdirect print server.

Table 8-3 Security Settings (continued)

Message	Description
	Not Specified: An SNMP set community name has not been set. Specified: A user-specified SNMP set community has been set.
Access List:	(IPv4 only) Identifies whether a host access control list is configured on the HP Jetdirect print server. A host access control list specifies the IP address of individual systems, or IP network of systems, that are allowed access to the print server and device. Specified: A host access list is configured on the HP Jetdirect print server. Not Specified: A host access list is not configured on the print server. All systems are allowed access.
Secure Web:	Specifies the use of encrypted communications between a browser and the HP Jetdirect embedded Web server. Optional (HTTPS/HTTP): Allows unencrypted communications using standard HTTP ports, as well as encrypted communications using HTTPS (secure HTTP). HTTPS Required: Only encrypted communications on HTTPS is allowed.

Network Statistics

Information in this section of the Jetdirect configuration page is described in Table 8-4 Network Statistics.

Table 8-4 Network Statistics

Message	Description
TOTAL PACKETS RECEIVED:	Total number of frames (packets) received by the HP Jetdirect print server without error. This includes broadcast, multicast packets, and packets specifically addressed to the print server. This number does not include packets specifically addressed to other nodes.
UNICAST PACKETS RECEIVED:	Number of frames specifically addressed to this HP Jetdirect print server. This does not include broadcasts or multicasts.
BAD PACKETS RECEIVED:	Total number of frames (packets) received with errors by the HP Jetdirect print server.
FRAMING ERRORS RECEIVED:	Maximum of CRC (Cyclic Redundancy Check) errors and framing errors. CRC errors are frames received with CRC errors. Framing errors are frames received with alignment errors. A large number of framing errors could indicate a cabling problem with your network.
TOTAL PACKETS TRANSMITTED:	Total number of frames (packets) transmitted without error.
UNSENDABLE PACKETS:	Total number of frames (packets) not successfully transmitted because of errors.
TRANSMIT COLLISIONS:	Number of frames not transmitted because of repeated collisions.
TRANSMIT LATE COLLISIONS:	Total number of frames not transmitted because a late collision occurred. Late collisions often occur when cable lengths exceed network specifications. A large number may indicate a cabling problem on the network.

TCP/IP Protocol Information

Information in this section of the Jetdirect configuration page is described below. For general TCP/IP configuration parameters, see Table 8-5 TCP/IP Configuration Information. For IPv4 parameters, see

Table 8-6 IPv4 Section. For IPv6 parameters, see Table 8-7 IPv6 Section. For error messages, see Table 8-12 Error Messages.

Table 8-5 TCP/IP Configuration Information

Message	Description
STATUS:	Current TCP status. READY: Indicates the HP Jetdirect print server is awaiting data over TCP/IP. DISABLED: Indicates that TCP/IP was manually disabled. INITIALIZING: Indicates that the print server is searching for the BOOTP server, or trying to get the configuration file through TFTP. An additional status message may also be displayed. An error code and message is displayed if the print server is not ready. For more information, see Table 8-12 Error Messages.
HOST NAME:	The host name configured on the print server. It may be truncated. Not Specified: Indicates that no host name was specified in a BOOTP response or TFTP configuration file. NPIxxxxxx: The default name is NPIxxxxxx, where xxxxxx represents the last six digits of the LAN hardware (MAC) address.
IPV4 DOMAIN NAME:	The Domain Name System (DNS) name of the IPv4 domain in which the HP Jetdirect print server resides (for example, support.company.com). It is not the fully qualified DNS name (for example, printer1.support.company.com) because the host printer name is not included. Not Specified: Indicates that a domain name has not been configured on the print server.
IPV6 DOMAIN NAME:	The Domain Name System (DNS) name of the IPv6 domain in which the HP Jetdirect print server resides (for example, support.company.com). It is not the fully qualified DNS name (for example, printer1.support.company.com) because the host printer name is not included. Not Specified: Indicates that a domain name has not been configured on the print server.
PRIMARY DNS SERVER:	The IPv4 address of the Domain Name System (DNS) server. Not Specified: Indicates that a primary DNS server has not been configured on the print server.
SECONDARY DNS SERVER:	The IPv4 address of the Domain Name System (DNS) server. Not Specified: Indicates that a secondary DNS server has not been configured on the print server.
DNS (IPV6)	The IPv6 address of one or more Domain Name System (DNS) servers. Not Specified: Indicates that an IPv6 DNS server has not been configured on the print server.
WINS SERVER:	The IP address of the Windows Internet Naming Service (WINS) server. Not Specified: Indicates that a WINS server's IP address has not been configured on the print server.
IDLE TIMEOUT:	The timeout value expressed in seconds after which the print server closes an idle TCP print data connection. Acceptable values are integers between 0 and 3600. A value of zero turns off the timeout mechanism. The default value is 270 seconds.

Table 8-5 TCP/IP Configuration Information (continued)

Message	Description

IPv4 Section

The following table includes items displayed under the IPv4 section of the configuration page.

Table 8-6 IPv4 Section

Message	Description
IP ADDRESS:	The Internet Protocol version 4 (IPv4) address assigned to the HP Jetdirect print server. This is a required entry for operation of the print server on a TCP/IP network. During initialization, a temporary value 0.0.0.0 is displayed. After two minutes, a default IP address 169.254/16 or 192.0.0.192 is assigned. Not Specified: Indicates that an IP address is not assigned or the value is zero.
SUBNET MASK:	The IPv4 subnet mask configured on the HP Jetdirect print server. During initialization, a temporary value 0.0.0.0 is displayed. Depending on configuration parameters, the print server may automatically assign a usable default value. Not Specified: Indicates that a subnet mask is not configured.
DEFAULT GATEWAY:	The IPv4 address of the gateway used when sending packets off the local network. Only one default gateway may be configured. During initialization, a temporary value 0.0.0.0 is displayed. If not provided, the IP address of the Jetdirect print server is used. Not Specified: Indicates that a default gateway is not configured.
CONFIG BY:	Identifies how the HP Jetdirect print server obtained its IPv4 configuration: BOOTP: Automatic configuration through a BOOTP server. BOOTP/TFTP: Automaticautomatic configuration through a BOOTP server and TFTP configuration file. DHCP: Automatic configuration through a DHCP server DHCP/TFTP: Automatic configuration through a DHCP server and TFTP configuration file. RARP: Automatic configuration through the Reverse Address Resolution Protocol. USER SPECIFIED: Manual configuration through Telnet, the printer's control panel, HP Web Jetadmin, embedded Web server, or other method. DEFAULT IP: The default IP address was assigned. This address may not be a valid address for your network. AUTO IP: A link-local IP address (169.254.x.x) was assigned. If the network is a link-local network, this address should be valid. NOT CONFIGURED: The print server was not configured with IP parameters. Verify that TCP/IP is enabled, or check for error status.
BOOTP SERVER: or DHCP SERVER:	Displayed if BOOTP, DHCP, or RARP is used for TCP/IP configuration. It specifies the IP address of the system that responds to the HP Jetdirect print server's request for automatic TCP/IP configuration over the network. Not Specified: Indicates that the configuration server's IP address could not be determined or was set to zero in the response packet.

Table 8-6 IPv4 Section (continued)

Message	Description
or RARP SERVER:	
BOOTP/DHCP SERVER:	Displayed during initialization while the HP Jetdirect print server attempts to obtain its TCP/IP configuration from a BOOTP or DHCP server. The temporary address displayed is 0.0.0.0.
TFTP SERVER:	The IP address of the system where the TFTP configuration file is located. During initialization, the temporary address 0.0.0.0 is displayed. Not Specified: Indicates that a TFTP server has not been not been set.
WEB JETADMIN URL:	If the HP Jetdirect print server is found on the network by HP Web Jetadmin, the URL of the host system used for HP Web Jetadmin services is displayed. The URL is limited to two lines and may be truncated. Not Specified: Indicates that the URL of the Web Jetadmin host system could not be identified or is not configured.
MDNS SERVICE NAME	Specifies a name (alphanumeric string) assigned to this device or service. This name is persistent and is used to resolve a particular device or service if socket information (such as the IP address) changes from session to session. Apple mDNS will display this service. The default service name is the printer model and the LAN Hardware (MAC) address.

IPv6 Section

The following table includes items displayed under the IPv6 section of the configuration page.

Table 8-7 IPv6 Section

Message	Description
LINK-LOCAL:	Specifies the IPv6 Link Local address configured on the print server. Not Configured: A link local address has not been configured.
STATELESS:	Specifies IPv6 Stateless addresses configured on the print server. Not Configured: A Stateless address has not been configured.
DHCPV6:	Specifies the print server IPv6 stateful address configured by a DHCPv6 server. Not Configured: A stateful address has not been configured.
MANUAL:	Specifies an IPv6 address manually configured on the print server, for example, through the printer control panel or the embedded Web server. Not Configured: An address has not been manually configured.

IPX/SPX Protocol Information

Information in this section of the Jetdirect configuration page is described in Table 8-8 IPX/SPX Configuration Information. For error messages, see Table 8-12 Error Messages.

Table 8-8 IPX/SPX Configuration Information

Message	Description
STATUS:	Indicates the current IPX/SPX protocol status. READY: Indicates the HP Jetdirect print server is awaiting data over IPX/SPX. DISABLED: Indicates that IPX/SPX was manually disabled. INITIALIZING: Indicates that the print server is registering the node address or name. An additional status message may also be displayed. An error code and message is displayed if the print server is not ready. For more information, see Table 8-12 Error Messages.
PRIMARY FRAME TYPE:	Specifies the frame type selection on the Jetdirect print server. AUTO SELECT: The print server automatically senses and limits the frame type to the first one detected. EN_8023: Limits the frame type to IPX over IEEE 802.3 frames. All others will be counted and discarded. EN_II: Limits the frame type to IPX over Ethernet frames. All others will be counted and discarded. EN_8022: Limits the frame type to IPX over IEEE 802.2 with IEEE 802.3 frames. All others will be counted and discarded. EN_SNAP: Limits the frame type to IPX over SNAP with IEEE 802.3 frames. All others will be counted and discarded.
NETWORK FRAME TYPE RCVD	The first column (Network) indicates the network number associated with a protocol frame type used for communication between a server and the HP Jetdirect print server. UNKNOWN: Indicates that the HP Jetdirect print server is still trying to determine which network number to use. The second column (Frame Type) identifies the frame type used with the associated network number: EN_8023, EN_8022, EN_II, EN_SNAP. Unless a specific frame type has been manually configured, the print server automatically determines the protocol frame type by listening to the network data being transferred over the network. DISABLED: Indicates that a specific frame type for that network has been manually configured. The third column (RCVD) indicates how many packets have been received for each frame type.

Novell NetWare Parameters

Information in this section of the Jetdirect configuration page is described in Table 8-9 Novell NetWare Configuration Information. For error messages, see Table 8-12 Error Messages.

Table 8-9 Novell NetWare Configuration Information

Message	Description
STATUS:	Indicates the current Novell NetWare configuration status. READY: Indicates the HP Jetdirect print server is awaiting data. DISABLED: Indicates that IPX/SPX was manually disabled.

Table 8-9 Novell NetWare Configuration Information (continued)

Message	Description
	INITIALIZING: Indicates that the print server is registering the node address or name. An additional status message may also be displayed. An error code and message is displayed if the print server is not ready. For more information, see Table 8-12 Error Messages.
NODE NAME:	Queue Server Mode: The print server name. This name must match a valid print server on the appropriate NetWare file server. The default name is NPIXXXXXX, where XXXXXX is the last six digits of the LAN hardware (MAC) address. Remote Printer Mode: The name you gave the network printer when you configured the network printer. The default name is NPIXXXXXX.
NETWARE MODE:	The mode used by the HP Jetdirect print server. QUEUE SERVER: Indicates that the print server receives data directly from the queue. REMOTE PRINTER (followed by the printer number): Indicates that the print server emulates a Novell NetWare remote printer. If the printer is not configured, this field displays QUEUE SERVER.
NDS TREE NAME:	Displays the name of the Novell Directory Services (NDS) tree for this printer. NDS is a database of objects on a NetWare network organized in a hierarchical tree structure. Not Specified or blank: NDS is disabled.
NDS CONTEXT:	Displays the fully qualified NDS name where the HP Jetdirect print server object resides in the NDS tree. For example: CN=lj_pserver.OU=support.OU=mycity.OU=mycompany Not Specified or blank: NDS is disabled.
ATTACHED SERVER:	The Attached Server field identifies the Jetdirect discovery method [NSQ] (Nearest Service Query) or [GSQ] (General Service Query) and the name of the proxy file server used to locate the configured bindery servers. Not Specified or blank: A NetWare server has not been configured.
QUEUE POLL INTERVAL	(Job Poll Interval) Specifies the time interval (seconds) that the HP Jetdirect print server waits to check for print jobs in a print queue. The default is 2 seconds.
SAP INTERVAL:	Specifies the time interval (seconds) that the HP Jetdirect print server waits between Service Advertising Protocol (SAP) broadcasts on the network. The default is 60 seconds.
SERVER x:	Identifies a NetWare file server to which the HP Jetdirect print server is attached.

AppleTalk Protocol Information

Information in this section of the Jetdirect configuration page (Ethernet Only) is described in Table 8-10 AppleTalk Configuration Information. For error messages, see Table 8-12 Error Messages.

Table 8-10 AppleTalk Configuration Information

Message	Description
STATUS:	Indicates the current AppleTalk configuration status.

Table 8-10 AppleTalk Configuration Information (continued)

Message	Description
	READY: Indicates the HP Jetdirect print server is awaiting data. DISABLED: Indicates that AppleTalk was manually disabled. INITIALIZING: Indicates that the print server is registering the node address or name. An additional status message may also be displayed. An error code and message is displayed if the print server is not ready. For more information, see Table 8-12 Error Messages.
NAME:	The name of the printer on the AppleTalk network. A number after the name indicates that there are multiple devices with this name, and this is the Nth instance of the name.
ZONE:	The name of the AppleTalk network zone on which the printer is located.
TYPE:	The type of the printer being advertised on the network. Two types can be displayed.
NETWORK NUMBER: NODE NUMBER:	NETWORK NUMBER: Identifies the AppleTalk Network Number on which the HP Jetdirect print server is currently operating. NODE NUMBER: Identifies the AppleTalk Node Number that the print server chose for itself as part of its initialization sequence. **NOTE** The AppleTalk phase 2 (P2) parameter is preconfigured on the HP Jetdirect print server.

DLC/LLC Protocol Information

Information in this section of the Jetdirect configuration page is described in Table 8-11 DLC/LLC Configuration Information.

Table 8-11 DLC/LLC Configuration Information

Message	Description
STATUS:	Indicates the current DLC/LLC protocol status. READY: Indicates the HP Jetdirect print server is awaiting data. DISABLED: Indicates that DLC/LLC was manually disabled. INITIALIZING: Indicates that the print server is registering the node address or name. An additional status message may also be displayed. An error code and message is displayed if the print server is not ready. For more information, see Table 8-12 Error Messages.

Error Messages

Error codes and messages that may appear in the Status sections of the Jetdirect configuration page are described in Table 8-12 Error Messages.

Table 8-12 Error Messages

Error Code and Message	Description
02 LAN ERROR - INTERNAL LOOPBACK	During self-test, the HP Jetdirect print server detected an internal loopback test error. The print server may be faulty. If the error persists, replace the HP Jetdirect print server.
03 LAN ERROR - EXTERNAL LOOPBACK	The HP Jetdirect print server is incorrectly connected to your network or is defective. Make sure your HP Jetdirect print server is correctly attached to your network. In addition, check the cabling and connectors.
06 ENCRYPTION REQUIRED	Encryption is required on this network, but the print server cannot communicate on the network due to improper encryption settings. Check the encryption settings configured on the print server.
07 LAN ERROR - CONTROLLER CHIP	Check the network connections. If the connections are intact, run the power-on self-test: turn the printer off, then on again. If the error persists, replace the HP Jetdirect print server.
07 AUTHENTICATION FAILED	The Jetdirect print server could not access the network because of an authentication error. The error depends on the authentication method used. Verify the authentication method and settings on the print server.
08 LAN ERROR - INFINITE DEFERRAL	There is a network congestion problem. **NOTE** If the print server is not connected to the network, this error cannot occur.
08 AUTHENTICATION IN PROGRESS	Link-level authentication is in progress.
09 LAN ERROR - BABBLE	Check the network connections. If the connections are intact, run the power-on self-test: turn the printer off, then on again. If the error persists, replace the HP Jetdirect print server. For replacement instructions, see the hardware installation guide for your print server.
0A LAN ERROR - NO SQE	(Wired Ethernet) Check the network connections. If the connections are intact, run the power-on self-test: turn the printer off, then on again. If the error persists, replace the HP Jetdirect print server.
0C LAN ERROR - RECEIVER OFF	There may be a problem with your network cabling or the HP Jetdirect print server. Check the cabling and connectors on your Ethernet network. If you cannot find a problem with your network cabling, run the power-on self-test: turn the printer off, then on again. If the error persists after the printer is turned on again, there is a problem with the HP Jetdirect print server.
0D LAN ERROR - TRANSMITTER OFF	There may be a problem with your network cabling or the HP Jetdirect print server. Check the cabling and connectors on your Ethernet network. If you cannot find a problem with your network cabling, run the power-on self-test: turn the printer off, then on again. If the error persists, there is a problem with the HP Jetdirect print server.
0E LAN ERROR - LOSS OF CARRIER	Check the network connections. If the connections are intact, run the power-on self-test: turn the printer off, then on again. If the error persists, replace the HP Jetdirect print server.
10 LAN ERROR - UNDERFLOW	(Wired Ethernet) There may be a problem with your network cabling or the HP Jetdirect print server. Check the cabling and connectors on your network. If you cannot find a problem with your network cabling, run the power-on self-test: turn the printer off, then on again. If the error persists, there is a problem with the HP Jetdirect print server.
11 LAN ERROR - RETRY FAULTS	(Wired Ethernet) There is a problem with your network cabling or external network configuration. Verify operation of the hub or switch port.

Table 8-12 Error Messages (continued)

Error Code and Message	Description
12 LAN ERROR - NO LINKBEAT	With a wired Ethernet port connected, this message is displayed if Link Beat is not sensed. Check the network cable, and verify that the concentrator/hub is providing Link Beat.
13 NETWORK RECONFIG - MUST REBOOT	Reset or power off/on the HP Jetdirect print server to enable new configuration values.
14 DISCONNECTED	The Novell NetWare protocol is disconnected. Check the server and the print server.
15 CONFIGURATION ERROR	(Ethernet) The configuration information for the NetWare functions is not stored correctly on the HP Jetdirect print server. Use the installation software, embedded Web server, or other tools to reconfigure the print server. If this error persists, there may be a problem with the HP Jetdirect print server.
16 NOT CONFIGURED	(Ethernet) The HP Jetdirect print server has not been configured for NetWare. Use the installation software, embedded Web server, or other tools to configure the print server for NetWare networks.
17 UNABLE TO FIND SERVER	(Ethernet) The HP Jetdirect print server was unable to find the NetWare print server (Remote Printer mode) or file server (Queue Server mode). (There was no response to service queries for advertising print servers or file servers that matched the configured print server or file server name.) Make sure that the print server or file server is running and that the print server or file server name configured on the HP Jetdirect print server matches the actual name used by the print server or file server. Also make sure that all cables and routers are functioning correctly.
18 PASSWORD ERROR	The HP Jetdirect print server detected that the password for the NetWare print server object is wrong. Use a NetWare utility (such as PCONSOLE) to erase the password for the print server object. When the HP Jetdirect print server logs on again, it sets a new password. **NOTE** When multiple file servers are configured, the error is only displayed on the configuration page if none of the file servers are connected.
19 NO QUEUE ASSIGNED	The HP Jetdirect print server detected that the print server object has not been assigned any queues to service. Assign queues to the print server object using printer installation or NetWare utilities. **NOTE** When multiple file servers are configured, the error is only displayed on the configuration page if none of the file servers were successfully connected.
1A PRINTER NUMBER NOT DEFINED	A NetWare printer number for this printer has not been configured. Assign a valid printer number to the HP Jetdirect print server. Use a NetWare utility (such as PCONSOLE), the Jetdirect embedded Web server, or other tool to assign a printer number.
1B PRINTER NUMBER IN USE	The NetWare printer number assigned to the printer is already in use by another printer. Assign an unused printer number. This may also occur when a printer is powered off/on, in which case the error goes away after the print server times out and detects the lost connection.
1C PRINT SERVER NOT DEFINED	The file server does not have a print server object that corresponds to the specified NetWare node name. Use printer installation software, a NetWare utility (such as PCONSOLE), or other tool to create the print server object. When the HP Jetdirect print server is configured for multiple file servers, the error is only displayed on the configuration page if none of the file servers made the connection.

Table 8-12 Error Messages (continued)

Error Code and Message	Description
1D UNABLE TO CONNECT TO SERVER	**Remote Printer mode error**: The HP Jetdirect print server was unable to establish an SPX connection with the NetWare print server. Make sure that the NetWare print server is running and that all cables and routers are functioning correctly.
1E FAIL RESERVING PRINTER NUM	The SPX connection to the print server was lost when the HP Jetdirect print server attempted to reserve the printer number. This indicates a possible network problem, or a problem with the print server. Make sure all cables and routers are functioning correctly. Try restarting the print server.
1F ERR NEGOTIATING BUFFER SIZE	A failure was detected when selecting the buffer size to be used when reading print data from the file server. This may indicate a network problem. When the HP Jetdirect print server is configured for multiple file servers, the error is only displayed on the configuration page if none of the file servers was successfully connected.
20 UNABLE TO LOGIN	A failure was detected when the HP Jetdirect print server tried to log onto the file server. This could be caused by the print server object not existing on the file server, or by a security check that prevents the print server from logging in. Make sure the file server name and print server object name are correct. Use PCONSOLE to erase the password for the print server object. Create a new print server object. When the HP Jetdirect print server is configured for multiple file servers, the error is only displayed on the configuration page if none of the file servers made the connection.
21 UNABLE TO SET PASSWORD	A failure was detected when the HP Jetdirect print server tried to set the password for the print server object. (Whenever the HP Jetdirect print server is able to log in without a password, it sets the password automatically.) This indicates a networking or security problem. Create a new print server object. When multiple file servers are configured, the error is only displayed on the configuration page if none of the file servers were successfully connected.
22 UNABLE TO CONNECT TO SERVER	**Queue Server mode error**: The HP Jetdirect print server could not establish an NCP connection to the file server. Make sure that the correct file servers are connected. When multiple file servers are configured, the error is only displayed on the configuration page if none of the file servers were successfully connected.
23 UNABLE TO ATTACH TO QUEUE	A failure was detected when the HP Jetdirect print server tried to attach to one of the queues assigned to the print server object. This may be because no servers are allowed to attach to this queue. There may also be a networking or security problem. Use PCONSOLE to make sure that servers are allowed to attach to the queue, to delete the print server object from the list of queue servers if you want the HP Jetdirect print server to service other queues, or to delete the queue and create a new one (the print server object must be added to the list of queue servers). When the HP Jetdirect print server is configured for multiple file servers, the error is only displayed on the configuration page if none of the file servers made the connection.
24 PSERVER CLOSED CONNECTION	The NetWare print server requested a termination of the connection with the HP Jetdirect print server. No error exists or is indicated. Make sure the NetWare print server is running, and restart it if necessary.
25 DISCONNECTING - SPX TIMEOUT	The SPX connection to the print server was lost after the connection had been made. This indicates a possible network problem, or a problem with the print server. Make sure all cables and routers are functioning correctly. Try restarting the print server.

Table 8-12 Error Messages (continued)

Error Code and Message	Description
26 UNKNOWN NCP RETURN CODE	The HP Jetdirect print server encountered an unexpected fatal error after it had successfully connected to the file server. A wide variety of failures could produce this error message, including a downed file server or a network router failure.
27 UNEXPECTED PSERVER DATA RCVD	The print server sent some data when the HP Jetdirect print server had not given its permission to do so. This indicates a possible print server problem, possibly a software problem.
28 OUT OF BUFFERS	The HP Jetdirect print server was unable to allocate a buffer from its internal memory. This indicates all buffers are busy due possibly to heavy broadcast traffic or large amounts of network traffic directed to the print server.
29 UNABLE TO SENSE NET NUMBER	The HP Jetdirect print server has been trying for over 3 minutes to determine the NetWare protocol used on the network. Make sure that any file servers and routers are operating correctly. Make sure that the settings for NetWare frame type and source routing are correct.
2A NDS ERR: EXCEEDS MAX SERVERS	More queues were assigned than the HP Jetdirect print server can handle. Remove one or more print queues from the list to be serviced by Queue Server Mode.
2B NDS ERR: UNABLE TO LOGIN	Unable to log onto the NetWare directory tree. Make sure that the print server object is defined in the directory at the correct context. Clear the print server password using NWADMIN or similar NetWare tool.
2C NDS AUTHENTICATION ERROR	Unable to log onto the NetWare directory tree. Make sure that the print server object is defined in the directory at the correct context.
2D NDS ERR: CHANGE PSSWRD FAILED	Cannot modify the print server password to the value expected by the HP Jetdirect print server.
2E NDS SERVER PUBLIC KEY ERROR	Print Server Object Name mismatch. Unable to read the file server's public key. Verify object names, or contact the NDS administrator.
2F NDS ERR: SRVR NAME UNRESOLVD	The file server on the network cannot be located. The server may not be running at this time or a communications problem may exist.
30 NDS PRINT SERVER NAME ERROR	The HP Jetdirect print server object cannot be located in the specified NDS context.
31 NDS PS PRINTER LIST ERROR	Cannot locate a list of printers objects that should be assigned to the print server object.
32 NDS PRINTER OBJ NOTIFY ERR	The list of notification objects assigned to the printer object cannot be located.
33 NDS PRINT OBJ QUEUE LIST ERR	The list of print queues assigned to the printer objects cannot be located.
34 NDS ERR: UNRESOLVD PRNTR OBJ	The printer object cannot be located in the NDS directory.
35 NDS ERR: INVALID SRVR VERS	The current version of the NetWare file server is not supported.
36 NDS ERR: NO PRINTER OBJECTS	No printer objects are assigned to the print server object configured to this HP Jetdirect print server.
37 NDS ERR: MAX PRINT OBJECTS	Too many printer objects are assigned to the print server object. Using NetWare utilities (such as NWADMIN), reduce the number of printer objects assigned to the print server.
38 NDS ERR: NO QUEUE OBJECTS	No print queue objects are assigned to the printer objects located in the NDS directory.
39 NDS ERR: MAX QUEUE OBJECTS	Too many print queue objects are assigned to the printer. Reduce the number of queues assigned.

Table 8-12 Error Messages (continued)

Error Code and Message	Description
3A NDS ERR: UNABLE TO FIND TREE	The NDS tree cannot be located. The message may occur when the file server is not running or when a network communications problem exists.
3B NDS CONNECTION STATE ERROR	The HP Jetdirect print server cannot change the NDS connection state. Check licenses on the spooling server.
3C NDS ERR: UNRESOLVED QUEUE	The print queue object cannot be located in the specified NDS context.
3D NDS ERR: CANNOT READ Q HOST	Cannot locate the file server on the network. The server may not be running at this time or a communications problem may exist.
3E NDS PRNT SRVR PUBLIC KEY ERR	Print Server Object Name mismatch. Unable to read the print server's public key. Verify object names. Verify that the object key assigned to the HP Jetdirect print server is a print server object and not a printer or other object.
3F UNABLE TO GET NDS SRVR ADDR	The NDS server address cannot be located or accessed.
40 ARP DUPLICATE IP ADDRESS	The ARP layer has detected another node on the network using the same IP address as the HP Jetdirect print server. Extended error information below this message shows the hardware address of the other node.
41 NOVRAM ERROR	The HP Jetdirect print server cannot read the contents of its NOVRAM.
42 INVALID IP ADDRESS	The IP address specified for the HP Jetdirect print server (through BOOTP) is an invalid IP address for specifying a single node. Check your Bootptab file for proper entries.
43 INVALID SUBNET MASK	The IP subnet mask specified for the HP Jetdirect print server (through BOOTP) is an invalid subnet mask. Check your Bootptab file for proper entries.
44 INVALID GATEWAY ADDRESS	The default gateway IP address specified for the HP Jetdirect print server (through BOOTP) is an invalid IP address for specifying a single node. Check your Bootptab file for proper entries.
45 INVALID SYSLOG ADDRESS	The syslog server IP address specified for the HP Jetdirect print server (through BOOTP) is an invalid IP address for specifying a single node. Check your Bootptab file for proper entries.
46 INVALID SERVER ADDRESS	The TFTP server IP address specified for the HP Jetdirect print server (through BOOTP) is an invalid IP address for specifying a single node. Check your Bootptab file for proper entries.
47 INVALID TRAP DEST ADDRESS	One of the SNMP trap (Trap PDU) destination IP addresses specified for the HP Jetdirect print server (through TFTP) is an invalid IP address for specifying a single node. Check your TFTP configuration file.
48 CF ERR - FILE INCOMPLETE	The TFTP configuration file contained an incomplete last line that did not end in a newline character.
49 CF ERR - LINE TOO LONG	A line being processed in the TFTP configuration file was longer than the HP Jetdirect print server could accept.
4A CF ERR - UNKNOWN KEYWORD	A TFTP configuration file line contained an unknown keyword.
4B CF ERR - MISSING PARAMETER	A line in the TFTP configuration file was missing a required parameter.
4C CF ERR - INVALID PARAMETER	A line in the TFTP configuration file contained an invalid value for one of the parameters on that line.
4D CF ERR - ACCESS LIST EXCEEDED	The TFTP configuration file specified too many access list entries using the “allow:” keyword.

Table 8-12 Error Messages (continued)

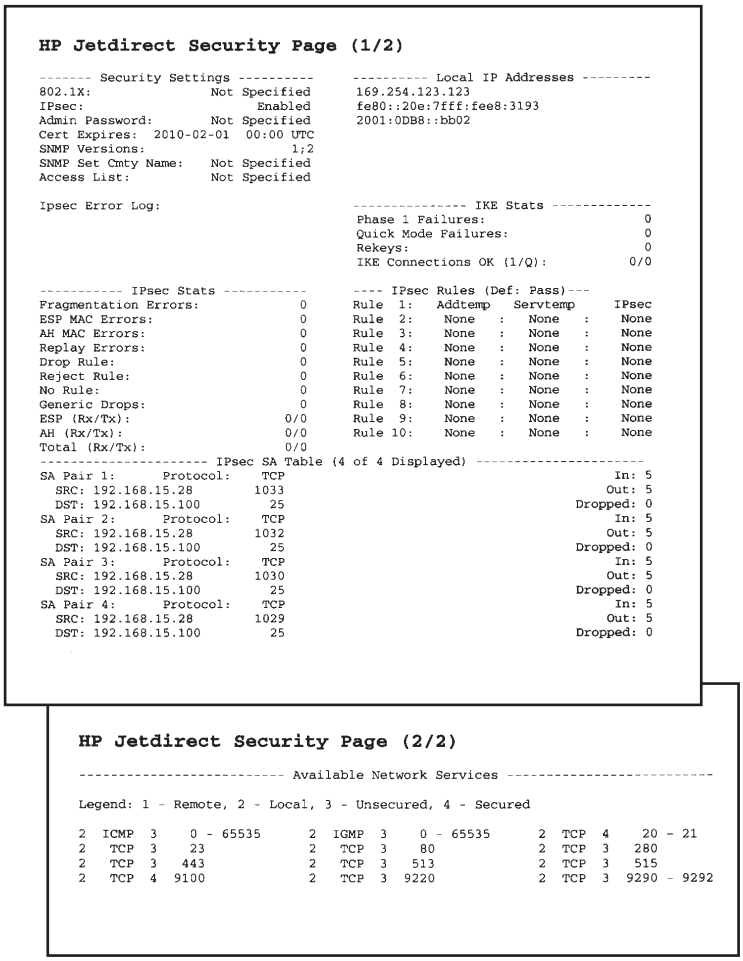
Error Code and Message	Description
4E CF ERR - TRAP LIST EXCEEDED	The TFTP configuration file specified too many trap destination list entries using the “trap-destination:” keyword.
4F TFTP REMOTE ERROR	The TFTP transfer of the configuration file from the host to the HP Jetdirect print server failed with the remote host sending a TFTP ERROR packet to the print server.
50 TFTP LOCAL ERROR	The TFTP transfer of the configuration file from the host to the HP Jetdirect print server failed with the local print server encountering some form of inactivity timeout, or excessive retransmissions situation.
51 TFTP RETRIES EXCEEDED	The overall retrying of the TFTP transfer of the configuration file from the host to the HP Jetdirect print server has exceeded a retry limit.
52 BAD BOOTP/DHCP REPLY	An error was detected in the BOOTP or DHCP reply that the HP Jetdirect print server received. The reply either had insufficient data in the UDP datagram to contain the minimum BOOTP/DHCP header of 236 bytes, had an operation field that was not BOOTPREPLY(0X02), had a header field that did not match the print servers hardware address, or had a UDP source port that was not the BOOTP/DHCP server port (67/udp).
53 BAD BOOTP TAG SIZE	The tagsize in a vendor-specific field in the BOOTP reply is either 0, or greater than the remaining number of unprocessed bytes in the vendor-specified area.
54 BOOTP/RARP IN PROGRESS	The HP Jetdirect print server is currently in the process of obtaining its basic IP configuration information through BOOTP/RARP.
55 BOOTP/DHCP IN PROGRESS	The HP Jetdirect print server is currently in the process of obtaining its basic IP configuration information through BOOTP/DHCP, and has not detected any errors.
56 DHCP NAK	The HP Jetdirect print server received a negative acknowledgement message from the DHCP server in response to a configuration request.
57 UNABLE TO CONNECT DHCP SVR	The HP Jetdirect print server had received IP parameters from a DHCP server, but communication with the DHCP server has been lost. Check status of the DHCP server. If an infinite lease was assigned, the print server will use the IP address of the most recent DHCP server used, but operation may be degraded until a DHCP server responds.
58 POSTSCRIPT MODE NOT SELECTED	The printer does not support AppleTalk or AppleTalk extensions.
59 INCOMPLETE F/W - MUST DOWNLOAD	Firmware download message. Currently downloading firmware to the HP Jetdirect print server, or the download did not complete properly.
5A TURN PRINTER OFF / ON	Firmware download message. Download of firmware is complete. Power off/on the HP Jetdirect print server.
5C DHCP BAD REPLY	A bad reply was received from the DHCP server. Check your DHCP server settings for this print server.
5D DHCP LEASE DURATION TOO SHORT	The DHCP lease times for this print server's TCP/IP configuration settings are too short. Reconfigure the DHCP lease times on the DHCP server.
5E DHCP LEASE RELEASED	The lease for DHCP-configured parameters, including the IP address, have been released through a manual configuration method, such as through the printer's control panel.
5F WINS REGISTRATION FAILED	Attempts to register the print server's name on the WINS server failed. Check for duplicate names, or verify the WINS server configuration.
61 AUTO IP CONFIGURED	An IP address could not be retrieved over the network. The print server will default to an IP address using link-local addressing in the form 169.254.x.x.

Table 8-12 Error Messages (continued)

Error Code and Message	Description
62 DEFAULT IP CONFIGURED	An IP address could not be retrieved over the network. The print server will default to a legacy default IP address 192.0.0.192.
63 AUTO IP IN PROGRESS	The print server is automatically assigning an IP address using link-local addressing in the form 169.254.x.x.
64 INVALID PASSWORD	An invalid password was specified through TFTP. Verify that the password consists of a maximum of 16 printable characters.
83 DISCONNECTING FROM SERVER	The server has been shut down because of a configuration change or reset request. This message automatically clears after a few seconds, unless the printer is offline, is in an error state, or is servicing another I/O port or another network protocol.
84 DHCP LEASE TIMERS ADJUSTED	The print server detected a DHCP lease error due to one of the following conditions: ■ Renew time is less than 30 seconds. ■ Rebind time is less than 52 seconds. ■ Rebind time is less than, or equal to, the Renew time. ■ The lease duration is less than, or equal to, the Rebind time.
86 FOR MULTILANGUAGES UPGRADE AGAIN	When upgrading a supported print server that contains a firmware version prior to X.24.00, it will be necessary to perform the firmware upgrade again if you want the print server to support management tools (for example, the embedded Web server) using non-English languages.
F1 TRYING TO CONNECT TO SERVER	The HP Jetdirect print server is trying to connect to the NetWare server(s). This is a normal message. Wait until either the connection is established or another status message appears.
F2 TFTP IN PROGRESS	The print server is attempting to use TFTP to obtain TCP/IP configuration settings over the network.
F3 BOOTP/RARP IN PROGRESS	The print server is attempting to use BootP or RARP to obtain TCP/IP configuration settings over the network.
F4 BOOTP/DHCP IN PROGRESS	The print server is attempting to use BootP or DHCP to obtain TCP/IP configuration settings over the network.

Security Configuration Page

An enhanced Security page can be printed from the Jetdirect menu accessed through the printer control panel. A typical Security page is illustrated below.



HP Jetdirect Security Page (1/2)

```
------- Security Settings ----------      ---------- Local IP Addresses ---------
802.1X:                Not Specified      169.254.123.123
IPsec:                   Enabled          fe80::20e:7fff:fee8:3193
Admin Password:        Not Specified      2001:0DB8::bb02
Cert Expires:  2010-02-01  00:00 UTC
SNMP Versions:                 1;2
SNMP Set Cmty Name:    Not Specified
Access List:           Not Specified

Ipsec Error Log:                          ---------------- IKE Stats -------------
                                          Phase 1 Failures:                     0
                                          Quick Mode Failures:                  0
                                          Rekeys:                               0
                                          IKE Connections OK (1/Q):           0/0

----------- IPsec Stats -----------       ---- IPsec Rules (Def: Pass)---
Fragmentation Errors:              0      Rule  1:   Addtemp   Servtemp     IPsec
ESP MAC Errors:                    0      Rule  2:    None   :   None   :    None
AH MAC Errors:                     0      Rule  3:    None   :   None   :    None
Replay Errors:                     0      Rule  4:    None   :   None   :    None
Drop Rule:                         0      Rule  5:    None   :   None   :    None
Reject Rule:                       0      Rule  6:    None   :   None   :    None
No Rule:                           0      Rule  7:    None   :   None   :    None
Generic Drops:                     0      Rule  8:    None   :   None   :    None
ESP (Rx/Tx):                     0/0      Rule  9:    None   :   None   :    None
AH (Rx/Tx):                      0/0      Rule 10:    None   :   None   :    None
Total (Rx/Tx):                   0/0
---------------------- IPsec SA Table (4 of 4 Displayed) ----------------------
SA Pair 1:       Protocol:    TCP                                          In: 5
  SRC: 192.168.15.28         1033                                       Out: 5
  DST: 192.168.15.100          25                                   Dropped: 0
SA Pair 2:       Protocol:    TCP                                          In: 5
  SRC: 192.168.15.28         1032                                       Out: 5
  DST: 192.168.15.100          25                                   Dropped: 0
SA Pair 3:       Protocol:    TCP                                          In: 5
  SRC: 192.168.15.28         1030                                       Out: 5
  DST: 192.168.15.100          25                                   Dropped: 0
SA Pair 4:       Protocol:    TCP                                          In: 5
  SRC: 192.168.15.28         1029                                       Out: 5
  DST: 192.168.15.100          25                                   Dropped: 0
```

HP Jetdirect Security Page (2/2)

```
------------------------- Available Network Services --------------------------

Legend: 1 - Remote, 2 - Local, 3 - Unsecured, 4 - Secured

2  ICMP  3     0 - 65535      2  IGMP  3     0 - 65535      2  TCP  4     20 - 21
2   TCP  3    23              2   TCP  3    80             2  TCP  3    280
2   TCP  3   443              2   TCP  3   513             2  TCP  3    515
2   TCP  4  9100              2   TCP  3  9220             2  TCP  3  9290 - 9292
```

Figure 8-2 HP Jetdirect Security Page (635n)

The parameters in each section of the Security page are described below.

Security Settings

This section on the Security page provides similar information that is located on the standard HP Jetdirect configuration page. See the table below.

Table 8-13 Security Settings

Message	Description
802.1X	Identifies whether the print server has been configured with EAP/802.1X client authentication settings. Specified: 802.1X authentication has been configured. Not Specified: 802.1X authentication has not been configured.
IPsec:	Provides the print server's current IPsec status. Enabled: IPsec is enabled and operating as configured by the user. Disabled: IPsec is turned off.

Table 8-13 Security Settings (continued)

Message	Description
	Policy Failed: The print server failed to implement the IPsec policy that was configured. You may need to reset security (through the control panel or embedded Web server), or perform a cold-reset of the print server.
Admin Password:	Specifies whether an IP Administrator password has been configured on the print server. This password is shared by Telnet, the embedded Web server, and HP Web Jetadmin to control access to print server configuration parameters. Up to 16 case-sensitive, alphanumeric characters can be used. Not Specified: An Administrator password has not been set. Set: An Administrator password has been set. (The password may be cleared from the print server through a cold reset.)
Cert Expires:	Specifies the expiration date of the digital certificate for SSL/TLS encrypted security. The date is in UTC format (for example, “2002-10-02 12:45 UTC”). Not Applicable: Displayed if a digital certificate has not been installed.
SNMP Versions:	Specifies the SNMP versions enabled on the print server. Disabled: All SNMP versions are disabled on the print server. No SNMP access is allowed. 1;2: SNMP v.1 and SNMP v.2c are supported, and SNMP v.3 is disabled, or not supported. 1;2;3-na/np: SNMP v.1, v.2c, and v.3 are enabled. v.3 is enabled with the minimum security of no authentication (“na”) and no privacy (“np”). 1;2;3-a/np: SNMP v.1, v.2c, and v.3 are enabled. v.3 is enabled with the minimum security of authentication enabled (“a”) but no privacy (“np”). 1;2;3-a/p: SNMP v.1, v.2c, and v.3 are enabled. v.3 is enabled with the minimum security of authentication (“a”) with privacy (“p”) enabled. 3-na/np: SNMP v.1 and v.2c are disabled. SNMP v.3 is enabled with the minimum security of no authentication (“na”) and no privacy (“np”). 3-a/np: SNMP v.1 and v.2c are disabled. SNMP v.3 is enabled with the minimum security of authentication enabled (“a”) but no privacy (“np”). 3-a/p: SNMP v.1 and v.2c are disabled. SNMP v.3 is enabled with the minimum security of authentication (“a”) with privacy (“p”) enabled.
SNMP Set Cmty Name:	Specifies whether an SNMP set community name has been configured on the HP Jetdirect print server. An SNMP set community name is a password for write access to SNMP control functions (SNMP SetRequests) on the HP Jetdirect print server. Not Specified: An SNMP set community name has not been set. Specified: A user-specified SNMP set community has been set.
Access List:	(IPv4 only) Identifies whether a host access control list is configured on the HP Jetdirect print server. A host access control list specifies the IP address of individual systems, or IP network of systems, that are allowed access to the print server and device. Specified: A host access list is configured on the HP Jetdirect print server. Not Specified: A host access list is not configured on the print server. All systems are allowed access.

IPsec Error Log

This section is reserved for future use.

Local IP Addresses

This section lists the IPv4 and IPv6 addresses configured on the print server.

IPsec Stats

IPsec statistics gathered and reported by the print server are described below.

Table 8-14 IPsec Statistics

Message	Description
Fragmentation Errors:	Displays the number of fragmented packets that could not be reassembled.
ESP MAC Errors:	Displays the number of Encapsulating Security Payload (ESP) Message Authentication Code (MAC) errors. MACs are used to verify packet integrity, that is, the message received is the same as the one sent.
AH MAC Errors:	Displays the number of Authentication Header (AH) Message Authentication Code (MAC) errors. MACs are used to verify packet integrity, that is, the message received is the same as the one sent.
Replay Errors:	Displays the number of replay attacks, where unauthorized packets are being resent.
Drop Rule:	If the default IPsec rule is configured to drop all non-IPsec traffic, the number of dropped packets based on the IPsec rules is displayed. Client notification of dropped packets is not provided.
Reject Rule:	Displays the number of rejected IPsec packets. Client notification of rejected packets is provided through ICMP error messages.
No Rule:	Displays the number of packets received for which an IPsec policy rule is not configured.
Generic Drops:	Displays the number of packets dropped that are not counted by other statistics.
ESP (Rx/Tx):	Displays the total number of Encapsulating Security Payload (ESP) packets received (Rx) and transmitted (Tx) by the print server.
AH (Rx/Tx):	Displays the total number of Authentication Header (AH) packets received (Rx) and transmitted (Tx) by the print server.
Total (Rx/Tx):	Displays the total number of all packets received (Rx) and transmitted (Tx) by the print server.

IKE Stats

This section provides Internet Key Exchange (IKE) statistics for the print server.

Message	Description
Phase 1 Failures:	Displays the number of authentication failures when the print server is establishing a connection over IPsec, which result in connection failures.
Quick Mode	After authentication, this item displays the number of failures during IPsec protocol configuration, which results in connection failures.

Message	Description
Rekeys:	Displays the number of times keys have been regenerated (for example, after a key lifetime setting has been exceeded and then regenerated).
IKE Connections OK (1/Q):	Displays the number of successful IPsec connections for both Phase 1 and Quick Mode attempts, separated by a slash (Phase 1 count / Quick Mode count).

IPsec Rules

This section of the Security page identifies the IPsec Policy of the print server. The IPsec Policy consists of rules that control the security of the traffic received and transmitted by the print server. Rules are configured using an IPsec configuration wizard accessed through the print server's embedded Web server. Up to ten rules can be configured.

The heading of this section will indicate the default rule for IPsec traffic:

- **Pass**: The default IPsec rule is configured to allow all non-IPsec traffic.
- **Drop**: The default IPsec rule is configured to drop all non-IPsec traffic.

For each rule configured, the names of the IP address template, service template, and IPsec template that define the rule will be displayed. For more information, see IPsec Configuration.

IPsec SA Table

The IPsec SA Table lists the Security Associations (SA) of cached IPsec sessions between two hosts. While the number of active sessions may be large, the number of security associations listed in the table is limited to eight.

Table 8-15 IPsec Security Associations

Message	Description
SA Pair #:	A table entry number for a Security Association pair. Up to eight entries will be displayed.
Protocol:	Displays the protocol used by the hosts: TCP, UDP, or ICMP.
SRC:	Displays the IP address of the host that initiates the IPsec traffic.
DST:	Displays the IP address of the host that receives the IPsec traffic.
In: Out: Dropped:	Displays the number of IPsec packets received, transmitted, or dropped by the print server.

Available Network Services

This section of the Security page is used to list the well-known ports of Jetdirect services being accessed. A remote port is one associated with a remote client application, while a local port identifies a service and port number on the HP Jetdirect print server. In addition, a port may be identified as secure or not secure depending on the IPsec policy configuration.

For example, for LPD printing enabled with an IPsec rule, a local TCP, secure, port 515 would be listed. Port 515 is a well-known port for LPD services. And if the print server is connected to a remote application's port 25, it may list remote TCP, unsecure, port 25 of the client.

A LPD Printing

The HP Jetdirect print server contains an LPD (Line Printer Daemon) Server module to support LPD printing. This chapter describes how to configure the HP Jetdirect print server for use with various systems that support LPD printing. These instructions include:

- LPD on UNIX Systems
  - Configuring BSD-based UNIX systems using LPD
  - Configuring print queues using the SAM utility (HP-UX systems)
- LPD on Windows 2000/Server 2003 Systems
- LPD on Windows XP Systems
- LPD on Mac OS Systems

NOTE For other systems not listed, refer to your operating system documentation and online help.

Recent versions of Novell NetWare (NetWare 5.x with NDPS 2.1 or greater) support LPD printing. For setup instructions and support, refer to the documentation supplied with NetWare. Also, refer to the Technical Information Documentation (TID) on Novell's support Web site.

About LPD

Line Printer Daemon (LPD) refers to the protocol and programs associated with line-printer spooling services that may be installed on various TCP/IP systems.

Some of the widely used systems in which the HP Jetdirect print server functionality supports LPD include:

- Berkeley-based (BSD) UNIX systems
- HP-UX
- Solaris
- IBM AIX
- Linux
- Windows 2000
- Windows Server 2003
- Mac OS

The UNIX configuration examples in this section show the syntax for BSD-based UNIX systems. The syntax for your system may vary. See your system documentation for the correct syntax.

NOTE The LPD functionality can be used with any host implementation of LPD that complies with the RFC 1179 document. The process for configuring printer spoolers, however, may differ. See your system documentation for information on configuring these systems.

The LPD programs and protocol include the following:

Table A-1 LPD Programs and Protocols

Program Name	Purpose of Program
lpr	Queues jobs for printing
lpq	Displays print queues
lprm	Removes jobs from print queues
lpc	Controls print queues
lpd	Scans and prints the files if the specified printer is connected to the system. If the specified printer is connected to another system, this process forwards the files to an lpd process on the remote system where the files are to be printed.

Requirements for Configuring LPD

Before you can use LPD printing, your printer must be properly connected to the network through the HP Jetdirect print server, and you must have print server status information. This information is listed

on the HP Jetdirect printer configuration page. If you have not printed a configuration page from your printer, see your printer documentation for instructions. You must also have the following:

- An operating system that supports LPD printing.
- Superuser (root) or Administrator access to your system.
- The LAN hardware address (or station address) of the print server. This address is printed with print server status information on the HP Jetdirect configuration page and is of the form:

  HARDWARE ADDRESS: xxxxxxxxxxxx

  where x is a hexadecimal digit (for example, 0001E6123ABC).
- An IP address configured on the HP Jetdirect print server.

LPD Setup Overview

The following steps are necessary to configure the HP Jetdirect print server for LPD printing:

1. Setting up IP parameters.
2. Setting up print queues.
3. Printing a test file.

The following sections provide detailed descriptions for each step.

Step 1. Setting Up IP Parameters

To set up IP parameters on the HP Jetdirect print server, refer to TCP/IP Configuration.

Step 2. Setting Up Print Queues

You must set up a print queue for each printer or printer personality (PCL or PostScript) you use on your system. Also, different queues are required for formatted and unformatted files. The queue names `text` and `raw` in the following examples (see `rp` tag) have special meanings.

Table A-2 Supported Queue Names

`raw, raw1, raw2, raw3`	no processing
`text, text1, text2, text3`	carriage return added
`auto, auto1, auto2, auto3`	automatic
`binps, binps1, binps2, binps3`	binary PostScript
`<user-defined>`	defined by user; optionally including command strings before and after the print data

The line printer daemon on the HP Jetdirect print server treats data in the `text` queue as unformatted text or ASCII, and adds a carriage return to each line before sending it to the printer. (Note that the actual observed behavior is that a PCL line termination command (value of 2) is issued at the beginning of the job.)

The line printer daemon treats data in the `raw` queue as formatted files in PCL, PostScript, or HP-GL/2 languages and sends the data without change to the printer.

Data in the `auto` queue will be automatically processed as text or raw, as appropriate.

For the `binps` queue, the PostScript interpreter interprets the print job as binary PostScript data.

For user-defined queue names, the line printer daemon adds user-defined strings before or after the print data (user-defined print queues can be set up through Telnet, TCP/IP Configuration, or the embedded Web server, HP Jetdirect Embedded Web Server (V.31.xx)).

If the queue name is not one of the above, the HP Jetdirect print server assumes it to be `raw1`.

Step 3. Printing a Test File

Print a test file using the LPD commands. For instructions, see the information provided for your system.

LPD on UNIX Systems

Configuring Print Queues for BSD-based Systems

Edit the `/etc/printcap` file to include the following entries:

```
printer_name|short_printer_name:\
   :lp=:\
   :rm=node_name:\
   :rp=remote_printer_name_argument:\
   :lf=/usr/spool/lpd/error_log_filename:\
   :sd=/usr/spool/lpd/printer_name:
```

where `printer_name` identifies the printer to the user, `node_name` identifies the printer on the network, and `remote_printer_name_argument` is the print queue designation (such as `text, raw, binps, auto,` or user-defined).

For more information on printcap, see the printcap man page.

Example: Printcap Entries for ASCII or Text Printers

```
lj1_text|text1:\
   :lp=:\
   :rm=laserjet1:\
   :rp=text:\
   :lf=/usr/spool/lpd/lj1_text.log:\
   :sd=/usr/spool/lpd/lj1_text:
```

Example: Printcap Entries for PostScript, PCL, or HP-GL/2 Printers

```
lj1_raw|raw1:\
    :lp=:\
    :rm=laserjet1:\
    :rp=raw:\
    :lf=/usr/spool/lpd/lj1_raw.log:\
    :sd=/usr/spool/lpd/lj1_raw:
```

If your printer does not support automatic switching between PostScript, PCL, and HP-GL/2 languages, use the printer's control panel (if the printer has one) to select the printer language or rely on the application to select the printer language via commands embedded in the print data.

Make sure your users know the printer names for the printers, since they must type those names on the command line for printing.

Create the spooling directory by making the following entries. At the root directory, type:

```
mkdir /usr/spool/lpd
cd /usr/spool/lpd
mkdir printer_name_1 printer_name_2
chown daemon printer_name_1 printer_name_2
chgrp daemon printer_name_1 printer_name_2
chmod g+w printer_name_1 printer_name_2
```

where `printer_name_1` and `printer_name_2` refer to the printers to be spooled. You may spool several printers. The following example shows the command to create the spooling directories for printers used for text (or ASCII) printing and for PCL or PostScript printing.

Example: Creating Spooling Directory for Text and PCL/PostScript Printers

```
mkdir /usr/spool/lpd
cd /usr/spool/lpd
mkdir lj1_text lj1_raw
chown daemon lj1_text lj1_raw
chgrp daemon lj1_text lj1_raw
chmod g+w lj1_text lj1_raw
```

Configuring Print Queues Using SAM (HP-UX systems)

On HP-UX systems you can use the SAM utility to configure remote print queues for printing “text” (ASCII) files or “raw” (PCL, PostScript, or other printer language) files.

Before you execute the SAM program, select an IP address for the HP Jetdirect print server and set up an entry for it in the `/etc/hosts` file on your system running HP-UX.

1. Start the SAM utility as a superuser.
2. Select **Peripheral Devices** from the **Main** menu.
3. Select **Printers/Plotters** from the **Peripheral Devices** menu.
4. Select **Printers/Plotters** from the **Printers/Plotters** menu.

5 Select **Add a Remote Printer** from the **Actions** list, then select a printer name.

Examples: `my_printer` or `printer1`

6 Select a remote system name.

Example: `jetdirect1` (node name of the HP Jetdirect print server)

7 Select a remote printer name.

Type `text` for ASCII or `raw` for PostScript, PCL, or HP-GL/2.

Type `auto` to let the line printer daemon select automatically.

Type `binps` to instruct the PostScript interpreter to interpret the print job as binary PostScript data.

Type the name of a user-defined queue to include pre-defined strings before and/or after the print data (user-defined print queues can be set up through Telnet, HP Software Solutions Summary, and the embedded Web server, HP Jetdirect Embedded Web Server (V.31.xx)).

8 Check for a remote printer on a BSD system. You must type `Y`.

9 Click **OK** at the bottom of the menu. If the configuration is successful, the program prints the message:

The printer has been added and is ready to accept print requests.

10 Click **OK** and select **Exit** from the **List** menu.

11 Select **Exit Sam**.

NOTE By default, the lpsched is not running. Make sure you turn the scheduler on when you set up your print queues.

Printing a Test File

To verify that the printer and print server connections are correct, print a test file.

1 At the UNIX system prompt type:

```
lpr -Pprinter_name file_name
```

where `printer_name` is the designated printer and `file_name` refers to the file to be printed.

Examples (for BSD-based systems):

Text File: `lpr -Ptext1 textfile`

PCL File: `lpr -Praw1 pclfile.pcl`

PostScript File: `lpr -Praw1 psfile.ps`

HP-GL/2 File: `lpr -Praw1 hpglfile.hpg`

For HP-UX systems, substitute `lp -d` *for* `lpr -P`.

2 To get print status, type the following at the UNIX prompt:

```
lpq -Pprinter_name
```

where `printer_name` is the designated printer.

Examples (for BSD-based systems):

```
lpq -Ptext1
lpq -Praw1
```

For HP-UX systems, substitute `lpstat` *for* `lpq -P` *to get print status*.

This completes the process for configuring the HP Jetdirect print server to use LPD.

LPD on Windows 2000/Server 2003 Systems

This section describes how to configure supported Windows networks to use the HP Jetdirect LPD (Line Printer Daemon) services.

The process consists of two parts:

- Installing TCP/IP software (if not already installed).
- Configuring a network LPD printer.

Installing TCP/IP Software

This procedure lets you check whether you have TCP/IP installed on a supported Windows system, and to install the software if necessary.

NOTE You may need your Windows System distribution files or CD-ROMs to install TCP/IP components.

1. To check whether you have Microsoft TCP/IP Printing protocol and TCP/IP printing support:
   - Windows 2000/Server 2003—

     Windows 2000: Click **Start**, **Settings**, **Control Panel**. Then double-click the **Network and Dial-up Connections** folder. Double-click the **Local Area Connection** for your network and click **Properties**.

     Server 2003: Click **Start**, **All Programs**, **Accessories**, **Communications**, and open the **Network Connections** folder. Double-click the **Local Area Connection** for your network and click **Properties**.

     If Internet Protocol (TCP/IP) is listed and enabled in the list of components used by this connection, the necessary software is already installed. (Proceed to "Configuring a Network Printer for Windows 2000/Server 2003 Systems"). If not, go to step 2.
2. If you have not previously installed the software:
   - Windows 2000/Server 2003—In the **Local Area Connection Properties** window, click **Install**. In the **Select Network Component Type** window, select **Protocol** and click **Add** to add the **Internet Protocol (TCP/IP)**.

     Follow the instructions on the screen.

3 Enter TCP/IP configuration values for the computer:

- Windows 2000/Server 2003—On the **General** tab in the **Local Area Connection Properties** window, select **Internet Protocol (TCP/IP)** and click **Properties**.

If you are configuring a Windows server, type the IP address, default gateway address, and subnet mask in the appropriate spaces.

If you are configuring a client, check with your Network Administrator to learn whether you should enable automatic TCP/IP configuration or whether you should type a static IP address, default gateway address, and subnet mask in the appropriate spaces.

4 Click **OK** to exit.

5 If prompted, exit Windows and restart your computer for the changes to take effect.

Configuring a Network Printer for Windows 2000/Server 2003 Systems

Set up the default printer by performing the following steps.

1 Verify that the Print Services for Unix is installed (required for LPR port availability):

- On Windows 2000, click **Start**, **Setup**, and **Control Panel**. Double-click the **Network and Dial-up Connections** folder.

  On Server 2003: Click **Start**, **All Programs**, **Accessories**, **Communications**, and open the **Network Connections** folder.

- Click the **Advanced** menu and select **Optional Networking Components**.
- Select and enable **Other Network File and Print Services**.
- Click **Details**, and verify that **Print Services for Unix** is enabled. If not, enable it.
- Click **OK**, and then **Next**.

2 On Windows 2000, open the **Printers** folder (from the Desktop, click **Start**, **Settings**, and **Printers**).

On Server 2003, open the **Printers and Faxes** folder (from the Desktop, click **Start**, **Printers and Faxes**).

3 Double-click **Add Printer**. From the Add Printer Wizard welcome screen, click **Next**.

4 Select **Local printer**, and disable automatic detection for Plug and Play printer installation. Click **Next**.

5 Choose **Create a new port**, and select **LPR Port**. Click **Next**.

6 In the **Add LPR compatible printer** window:

- Enter the DNS name or IP address of the HP Jetdirect print server.

  NOTE Some client applications may not support the direct entry of an IPv6 address. However, support through the use of name resolution may be available provided the appropriate IPv6 records are configured in DNS. If name resolution is supported, you can enter the print server's host name or a fully qualified domain name (FQDN) on these applications.

- For the name of the printer or print queue on the HP Jetdirect print server, enter (in lowercase) **raw**, **text**, **auto**, **binps**, or the name of a user-defined print queue (user-defined print queues can be set up through the embedded Web server, see HP Jetdirect Embedded Web Server (V.31.xx)).

- Then click **OK**.

  NOTE The HP Jetdirect print server treats text files as unformatted text or ASCII files. Files that are raw are formatted files in PCL, PostScript, or HP-GL/2 printer languages.

  If the queue type is *binps*, the PostScript interpreter is instructed to interpret the print job as binary PostScript data.

7 Select the Manufacturer and Printer model. (If necessary, click **Have Disk** and follow the instructions to install the printer driver.) Click **Next**.

8 Choose to keep the existing driver, if prompted. Click **Next**.

9 Enter a printer name, and choose whether this printer will be the default printer. Click **Next**.

10 Choose whether this printer will be available to other computers. If shared, enter a share name that identifies the printer to other users. Click **Next**.

11 If desired, enter a location and other information for this printer. Click **Next**.

12 Choose whether to print a test page, and click **Next**.

13 Click **Finish** to close the wizard.

Verifying the Configuration

In Windows, print a file from any application. If the file prints correctly, the configuration was successful.

If the print job is not successful, try printing directly from DOS using the following syntax:

```
lpr -S <ipaddress> -P<queuename> filename
```

where `ipaddress` is the IP address of the print server, `queuename` is the name “raw” or “text” and `filename` is the file you wish to print. If the file prints correctly, the configuration was successful. If the file does not print, or prints incorrectly, see Troubleshooting the HP Jetdirect Print Server.

Printing from Windows Clients

If the LPD printer on the Windows server is shared, Windows clients can connect to the printer on the Windows server using the Windows Add Printer utility in the Printers folder.

LPD on Windows XP Systems

This section describes how to configure Windows XP networks to use the HP Jetdirect LPD (Line Printer Daemon) services.

The process consists of two parts:

- Adding Windows Optional Networking Components
- Configuring a Network LPD Printer.

Adding Windows Optional Networking Components

1. Click **Start**.
2. Click **Control Panel**.
3. Click **Network and Internet Connections**.
4. Click the **Network Connections** icon.
5. Select **Advanced** in the top menu bar. In the drop-down list, select **Optional Networking Components**.
6. Select **Other Network File and Print Services** and click **Next**. (If you select **Details** before selecting **Next**, you will see “Print Services for UNIX (R)” as a component of Other Network File and Print Services.) The files being loaded will be shown.
7. Close the Network Connections window. LPR port is now an option in the **Properties** of a printer under **Ports**, **Add Port**.

Configuring a Network LPD Printer

Adding a New LPD Printer

1. Open the **Printers** folder (from the desktop, click **Start**, **Printers and Faxes**).
2. Click **Add Printer**. On the Add Printer Wizard welcome screen, click **Next**.
3. Select **Local printer**, then *uncheck* the automatic detection for Plug and Play printer installation. Click **Next**.
4. Select **Create a new port**, and select **LPR Port** from the pull-down menu. Click **Next**.

5 In the Add LPR Compatible Printer window, do the following:

- Type the Domain Name System (DNS) name or Internet protocol (IP) address of the HP Jetdirect print server.

  NOTE Some client applications may not support the direct entry of an IPv6 address. However, support through the use of name resolution may be available provided the appropriate IPv6 records are configured in DNS. If name resolution is supported, you can enter the print server's host name or a fully qualified domain name (FQDN) on these applications.

- Type (in lowercase) the name of the print queue for the HP Jetdirect print server (for example: `raw, text, auto`, or `binps`.)
- Click **OK**.

6 Select the manufacturer and printer model. (If necessary, click **Have Disk** and follow the instructions to install the printer driver.) Click **Next**.

7 Click **Yes** to keep the existing driver, if prompted. Click **Next**.

8 Type a printer name and (if desired) click this printer as default (if desired). Click **Next**.

9 Select whether to *share* this printer with other network computers (for example, if your system is a printer server). If shared, type a share name to identify the printer to other users. Click **Next**.

10 If desired, enter a location and other information for this printer. Click **Next**.

11 Click **Yes** to print a test page, then click **Next**.

12 Click **Finish** to close the wizard.

Creating an LPR Port for an Installed Printer

1 Click **Start**, **Printers and Faxes**.

2 Right-click the **Printer** icon, and select **Properties**.

3 Select the **Ports** tab and **Add Port**.

4 Select **LPR Port** from the Printer Ports dialog box, and select **New Port**.

5 In the field labeled **Name or address of server providing lpd**, enter the DNS name or IP address of the HP Jetdirect print server.

NOTE Some client applications may not support the direct entry of an IPv6 address. However, support through the use of name resolution may be available provided the appropriate IPv6 records are configured in DNS. If name resolution is supported, you can enter the print server's host name or a fully qualified domain name (FQDN) on these applications.

6 In the dialog box labeled *Name of printer or print queue on that server*, (in lowercase) type the name of the print queue for the HP Jetdirect print server (for example: `raw, text, auto, binps`, or user-specified print queue).

7 Select **OK**.

8 Select **Close** and **OK** to close the **Properties** box.

LPD on Mac OS Systems

LaserWriter 8 version 8.5.1 or higher is required in order to support IP printing on computers running any of the following:

- Mac OS 8.1 or higher
- Mac OS 7.5 through Mac OS 7.6.1
- Desktop Printer Utility 1.0 or later

NOTE IP printing in LaserWriter 8 is not available on Mac OS 8.0.

Assigning an IP Address

Before you can set up a printer for LPR printing, assign an IP address to the printer or print server. Use the HP LaserJet Utility to configure the printer IP address as follows:

1 Double-click **HP LaserJet Utility** in the HP LaserJet folder.

2 Click the **Settings** button.

3 Select **TCP/IP** from the scrolling list and then click **Edit**.

4 Select the desired option. You can automatically obtain the TCP/IP configuration from either the DHCP server or the BOOTP server, or you can manually specify the TCP/IP configuration.

Setting Up Mac OS

To configure a computer for LPR printing, do the following:

1 Launch the **Desktop Printer Utility**.

2 Select **Printer (LPR)** and click **OK**.

3 In the *PostScript Printer Description (PPD) File* section, click **Change...** and select the PPD for your printer.

4 In the *Internet Printer* or the *LPR Printer* section, depending on your version of the Desktop Printer Utility, click **Change...**.

5 Enter the printer's IP address or domain name for *Printer Address*.

NOTE Some client applications may not support the direct entry of an IPv6 address. However, support through the use of name resolution may be available provided the appropriate IPv6 records are configured in DNS. If name resolution is supported, you can enter the print server's host name or a fully qualified domain name (FQDN) on these applications.

6 Enter the queue name, if used. Otherwise, leave it blank.

NOTE The queue name is typically `raw`. Other valid queue names are `text`, `binps`, `auto`, or a user-defined queue name (user-defined print queues can be set up through Telnet or the embedded Web server, see HP Jetdirect Embedded Web Server (V.31.xx)).

7 Click **Verify** to verify that the printer was found.

8 Click **OK** or **Create**, depending on your version of the Desktop Printer Utility.

9 Go to the **File** menu and select **Save** or use the resulting save dialog, depending on your version of the Desktop Printer Utility.

10 Enter a name and location for the desktop printer icon and click **OK**. The default name is the printer's IP address, and the default location is on the desktop.

11 Exit the program.

For the latest information on using the HP Jetdirect LPD services from Mac OS systems, search for “LPR printing” at Apple Computer's Tech Info Library Web site at http://til.info.apple.com.

B FTP Printing

FTP (File Transfer Protocol) is a basic TCP/IP connectivity utility to transfer data between systems. FTP printing is a way to use FTP to send print files from a client system to an HP Jetdirect-connected printer. In an FTP printing session, the client connects and sends a print file to the HP Jetdirect FTP server which in turn passes the print file to the printer.

NOTE For HP Jetdirect 635n print servers, FTP printing over IPv4 is supported as in prior releases, but FTP printing over IPv6 is not supported.

The HP Jetdirect FTP server can be enabled or disabled through a configuration tool, such as Telnet (see TCP/IP Configuration) or the embedded Web server (see HP Jetdirect Embedded Web Server (V.31.xx)).

Requirements

FTP printing described here requires the following:

- TCP/IPv4 client systems with FTP that complies with RFC 959.

NOTE For the most recent list of tested systems, visit HP online support at www.hp.com/support/net_printing.

Print Files

The HP Jetdirect FTP server transfers print files to the printer but does not interpret them. For proper printing, print files must be in a language recognized by the printer (such as PostScript, PCL, or unformatted text). For formatted print jobs, you must first print to a file from your application using the driver for the selected printer, then transfer the print file to the printer through an FTP session. For formatted print files, use binary (image) type transfers.

Using FTP Printing

FTP Connections

Similar to standard FTP file transfers, FTP printing uses two TCP connections: a control connection and a data connection.

Once an FTP session is opened, it remains active until either the client closes the connection or the data and control connections are idle for a time that exceeds the idle timeout period (default is 270 seconds). The idle timeout can be set through various TCP/IP configuration tools, such as BOOTP/

TFTP, Telnet, printer's control panel (see TCP/IP Configuration), the embedded Web server (see HP Jetdirect Embedded Web Server (V.31.xx)), or management software.

Control Connection

Using standard FTP, a control connection is opened by the client to the FTP server on the HP Jetdirect print server. FTP control connections are used to exchange commands between the client and the FTP server. The HP Jetdirect print server supports up to four control connections (or FTP sessions) simultaneously. If the number of allowed connections is exceeded, a message indicating that service is not available will be displayed.

FTP control connections use TCP port 21.

Data Connection

A second connection, a data connection, is created each time a file is transferred between the client and the FTP server. The client controls the creation of a data connection by issuing the commands that require a data connection (such as FTP `ls`, `dir` or `put` commands).

Although the `ls` and `dir` commands are always accepted, the HP Jetdirect FTP server supports a single data connection for printing at a time.

The transmission mode for an FTP data connection with the HP Jetdirect print server is always in stream mode, which marks the end-of-file by closing the data connection.

Once a data connection is established, the file transfer type (ASCII or binary) can be specified. Clients may attempt to autonegotiate a transfer type, and the default transfer type depends on the client system (for example, Windows NT may default to ASCII, while UNIX may default to binary). To specify the transfer type, enter the `bin` or `ascii` command at the FTP prompt.

FTP Login

To start an FTP session, enter the following command from a MS-DOS or UNIX command prompt:

```
ftp <IP address>
```

where `<IP address>` is the valid IP address or node name configured for the HP Jetdirect print server. See the figure below.

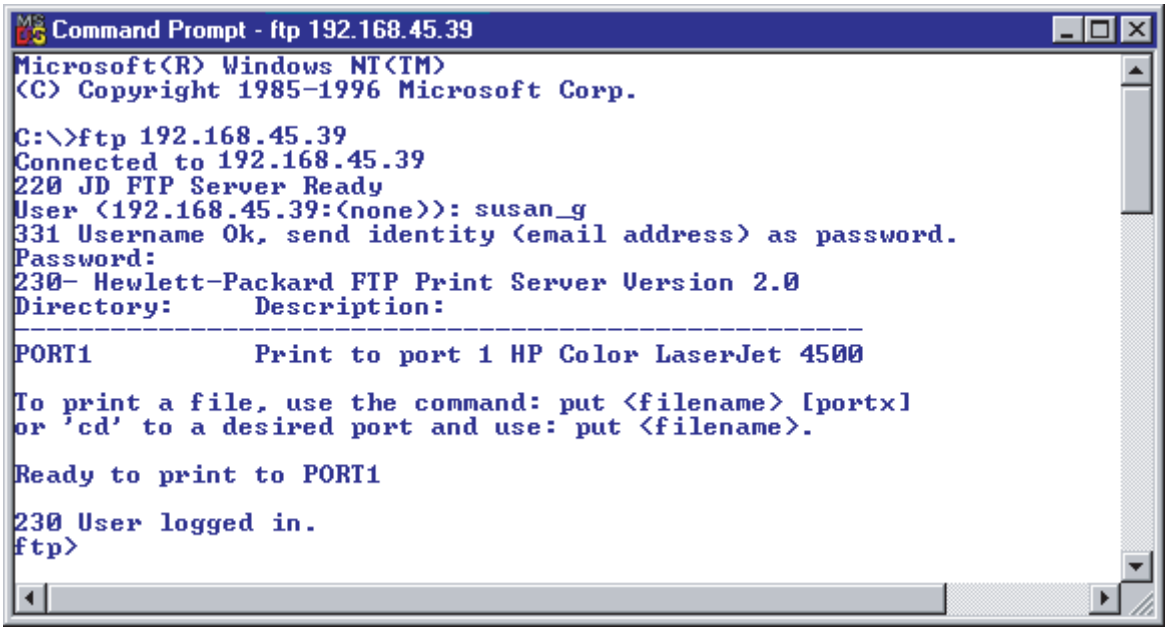


Figure B-1 FTP Login Example

If the connection is successful, a Ready message will be displayed.

After a successful connection, the user is prompted for a login name and password. The default is the client's login name. The Jetdirect FTP server will allow any user name. Passwords are ignored.

If login is successful, a message “230” will be displayed on the client system. In addition, the available HP Jetdirect ports for printing will be displayed. HP Jetdirect print servers supported in this guide provide a single port (Port 1). For a typical FTP printing session, see “Example of an FTP Session.”

Ending the FTP Session

To end an FTP session, type `quit` or `bye`.

NOTE Prior to ending an FTP session, a `Ctrl C` command is recommended to ensure the data connection is closed.

Commands

The following table summarizes commands available to the user during an FTP printing session.

Table B-1 User Commands for HP Jetdirect FTP Server

Command	Description
`user <username>`	`<username>` specifies a user. Any user will be accepted and can print to the selected port.
`cd <port#>`	`<port#>` selects a port number for printing. For supported HP Jetdirect embedded print servers, only **port1** is available.
`cd /`	`/` specifies the root directory of the HP Jetdirect FTP server.
`quit`	`quit` or `bye` terminates the FTP session with the HP Jetdirect print server.

Table B-1 User Commands for HP Jetdirect FTP Server (continued)

Command	Description
`bye`	
`dir`	`dir` or `ls` displays the contents of the current directory. If this command is typed in the root directory, a list of available ports for printing is displayed. For supported HP Jetdirect print servers, only **port1** is available.
`ls`	
`pwd`	Displays the current directory or the current Jetdirect printing port.
`put <filename>`	`<filename>` specifies the file to send to the selected HP Jetdirect print server port (Port 1).
`bin`	Configures an FTP binary (image) file transfer.
`ascii`	Configures an FTP ASCII file transfer. HP Jetdirect print servers support only non-print format control for character transfers (standard values for spacing and margins are used).
`Ctrl C`	Press the Ctrl and C keyboard keys simultaneously to abort the FTP service command and any transfer of data. The data connection is closed.
`rhelp remotehelp`	This command depends on your client system (use rhelp on UNIX, or remotehelp on Windows NT/2000/Server 2003) and displays a list of FTP system commands supported by the print server. (Note: The commands displayed are *not* user commands. User-accessible commands depend on the client's FTP system.)

Example of an FTP Session

This is an example of a typical FTP printing session:

```
C:\> ftp 192.168.45.39
Connected to 192.168.45.39.
220 JD FTP Server Ready
User <192.168.45.39:none>>:  susan_g
001 Username Ok, send identity <email address> as password
Password:
230- Hewlett-Packard FTP Print Server Version 2.0
Directory:              Description:
------------------------------------------------------------------------------------------------------------
PORT1                   Print to port 1 HP color LaserJet 4500

To print a file, use the command: put <filename> [portx]
or cd to a desired port and use: put <filename>.

Ready to print to PORT1

230 User logged in.
ftp> pwd
257 "/" is current directory. <"default port is : /PORT1>
HP Color LaserJet 4500"
ftp> cd port1
250 Changed directory to "/PORT1"
ftp> pwd
257 "/PORT1" is current directory. "HP Color LaserJet 4500"
ftp> bin
200 Type set to I. Using binary mode to transfer files.
ftp> put d:\atlas\temp\ftp_test.ps
200 PORT command successful.
150 Opening BINARY mode data connection
226- Ready
226- Processing job
226 Transfer complete
31534 bytes sent in 0.04 seconds <788.35 Kbytes/sec>
ftp> quit
221 Goodbye
C:\>
```

Figure B-2 FTP Session Example

C The HP Jetdirect EIO Control Panel Menu

When supported by the printer, HP Jetdirect EIO internal print servers contain a configuration menu that can be accessed from the printer's control panel. The keystrokes to access this menu from the printer control panel depend on the printer. Refer to the printer manuals for more information.

NOTE This section describes the EIO control panel menus for the HP Jetdirect 635n print server with firmware version V31.xx.nn

The HP Jetdirect internal print servers support the following printer control panels:

- Classic Control Panel display with menu and parameter selection buttons
- Graphical Control Panel display with navigation and numeric keypads (available on newer HP LaserJet printer models)

Classic Control Panel

Classic control panels can typically display two lines of 16 characters each.

As described in Table C-1 HP Jetdirect Classic Control Panel Menu, the HP Jetdirect control panel menu allows you to enable or disable network protocols, and configure selected network parameters. On the control panel display, an asterisk (*) is used to identify the selected value.

Table C-1 HP Jetdirect Classic Control Panel Menu

Menu Item	Description
CFG NETWORK=	Selects whether or not you want to access the Jetdirect menu. NO (default): Bypass the HP Jetdirect menu. YES: Access the HP Jetdirect menu. You must change this to YES* each time you want to access the menu.
TCP/IP= **IPX/SPX=** **DLC/LLC=** **ATALK=**	Identifies whether the protocol stack is enabled or disabled. ON (default): The protocol is enabled. OFF: The protocol is disabled.
CFG TCP/IP=	Selects whether you want to access the TCP/IP menu and set TCP/IP protocol parameters. NO (default): Bypass the TCP/IP menu items. YES: Access the TCP/IP menu items. ■ BOOTP=YES* enables IPv4 configuration by a BootP Server. ■ DHCP=YES* enables IPv4 configuration by a DHCP Server. If DHCP=YES* and the print server has a DHCP lease, you can choose to configure the following DHCP settings: ■ RELEASE: Choose YES to release, or NO to save, the current DHCP lease. ■ RENEW: Choose YES to renew the current DHCP lease, or NO to not renew the DHCP lease. ■ AUTO IP=YES* will automatically assign a link-local IPv4 address in the form 169.254.x.x.

Table C-1 HP Jetdirect Classic Control Panel Menu (continued)

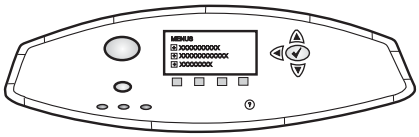
Menu Item	Description
	If you specify BOOTP=NO*, DHCP=NO* and AUTO IP=NO*, you can manually set the following TCP/IPv4 parameters from the control panel: ■ Each byte of the IPv4 address (IP) ■ Subnet Mask (SM) ■ Syslog Server (LG) ■ Default Gateway (GW) ■ Idle Timeout period (default is 270 seconds, 0 disables the timeout) ■ CFG DNS 1=YES* will allow you to specify the IPv4 address of a primary DNS server, one byte at a time. ■ CFG DNS 2=YES* will allow you to specify the IPv4 address of a secondary DNS server, one byte at a time. ■ IPV6 = YES* enables IPv6 operation on the print server. Select NO to disable IPv6 operation. ■ POLICY=<option> allows you to select one of the following IPv6 addressing policies for the print server. ■ RTR_AV: (default) The stateful auto-configuration method to be used by the print server is determined by a router. The router specifies whether or not the print server is to obtain its address, its configuration information, or both from a DHCPv6 server. ■ RTR_UN: If a router is not available, the print server should attempt to obtain its stateful configuration from a DHCPv6 server. ■ ALWAYS: Whether or not a router is available, the print server will always attempt to obtain its stateful configuration from a DHCPv6 server. ■ MANUAL=<option> specifies the behavior for a manually-configured IPv6 address detected on the print server. ■ KEEP: (default) If configured, maintain the address in an active state. ■ DISABLE: If configured, maintain the address but in an inactive state. Print a Jetdirect configuration page to verify your settings. However, note that the print server may overwrite selected parameters with values that ensure proper operation.
CFG IPX/SPX=	Selects whether you want to access the IPX/SPX menu and set IPX/SPX protocol parameters. NO (default): Bypass the IPX/SPX menu items. YES: Access the IPX/SPX menu items. In the IPX/SPX menu, you can specify the `Frame Type` parameter used on your network. ■ AUTO (default) will automatically set and limit the frame type to the first one detected. ■ For Ethernet cards, frame type selections include EN_8023, EN_II, EN_8022, EN_SNAP.
WEB=	For configuration management, specify whether the embedded Web server will accept communications using HTTPS (Secure HTTP) only, or both HTTP and HTTPS. HTTPS: For secure, encrypted communications, only HTTPS access is accepted. The print server will appear as a secure site. HTTP/HTTPS: Access using either HTTP or HTTPS is permitted.

Table C-1 HP Jetdirect Classic Control Panel Menu (continued)

Menu Item	Description
SECURITY=	Specify whether the current security settings on the print server will be saved or reset to factory defaults. KEEP (default): The current security settings are maintained. RESET: Security settings are reset to factory defaults.
IPSEC	Specify the state of IPsec on the print server. KEEP (default): IPsec operation will be maintained as currently configured on the print server. DISABLE: IPsec will be disabled on the print server.
PRINT	Print a configuration page for the selected item. PROTOCOLS: Use this item to print a page containing the configuration of the following protocols: IPX/SPX, Novell NetWare, AppleTalk, DLC/LLC. SECURITY: Use this item to print a page that contains the current security settings on the HP Jetdirect print server.
CFG LINK=	Selects whether you want to manually configure the HP Jetdirect print server's network link. NO (default): Bypass the link configuration menu items. YES: Access the link configuration menu items.
	The link speed and communication mode of the print server must match the network. The available settings depend on the print server model. One of the following link configuration settings can be selected: **CAUTION** If you change the link setting, network communications with the print server and network device may be lost. **AUTO** (default): The print server uses auto-negotiation to configure itself with the highest link speed and communication mode allowed. If auto-negotiation fails, either 100TX HALF or 10TX HALF is set depending on the detected link speed of the hub/switch port. (A 1000T half-duplex selection is not supported.) **10T HALF**: 10 Mbps, half-duplex operation. **10T FULL**: 10 Mbps, Full-duplex operation. **100TX HALF**: 100 Mbps, half-duplex operation. **100TX FULL**: 100 Mbps, full-duplex operation. **100TX AUTO**: Limits auto-negotiation to a maximum link speed of 100 Mbps. **1000 FULL**: 1000 Mbps, full-duplex operation.

Graphical Control Panel

Graphical control panels typically display 18 characters on a line, and as many as four lines at a time. In addition, scrolling may be supported to allow display of additional lines.



On graphical control panels, a numeric keypad and navigation buttons are used to access HP Jetdirect menu items. For a description of menu items and options, see Table C-2 HP Jetdirect Graphical Control Panel Menu.

Table C-2 HP Jetdirect Graphical Control Panel Menu

Menu Item	Submenu Options	Additional Options	Description of settings
TCP/IP	**ENABLE**		ON: Enable the TCP/IP protocol OFF: Disable the TCP/IP protocol
	HOST NAME		An alphanumeric string, up to 32 characters, used to identify the device. This name is listed on the Jetdirect configuration page. The default host name is NPIxxxxxx, where xxxxxx is the last six digits of the LAN hardware (MAC) address.
	IPV4 SETTINGS	**CONFIG METHOD**	Specifies the method that TCP/IPv4 parameters will be configured on the Jetdirect print server. ■ BOOTP: Use BootP (Bootstrap Protocol) for automatic configuration from a BootP server. ■ DHCP: Use DHCP (Dynamic Host Configuration Protocol) for automatic configuration from a DHCPv4 server. If selected and a DHCP lease exists, DHCP RELEASE and DHCP RENEW menus will be available to set DHCP lease options. ■ AUTO IP: Use automatic link-local IPv4 addressing. An address in the form 169.254.x.x will be automatically assigned. ■ MANUAL: Use the MANUAL SETTINGS menu to configure TCP/IPv4 parameters.
		DHCP RELEASE	This menu appears if CONFIG METHOD was set to DHCP and a DHCP lease for the print server exists. ■ NO (default): The current DHCP lease is saved. ■ YES: The current DHCP lease along with the leased IP address are released.

Table C-2 HP Jetdirect Graphical Control Panel Menu (continued)

Menu Item	Submenu Options	Additional Options	Description of settings
		DHCP RENEW	This menu appears if CONFIG METHOD was set to DHCP and a DHCP lease for the print server exists. ■ NO (default): The print server does not request to renew the DHCP lease. ■ YES: The print server requests to renew the current DHCP lease.
		MANUAL SETTINGS	(Available only if CONFIG METHOD is set to MANUAL) Configure parameters directly from the printer control panel: ■ IP ADDRESS n.n.n.n: The unique IP address of the printer, where n is a value from 0 to 255. ■ SUBNET MASK m.m.m.m: The subnet mask for the printer, where m is a value from 0 to 255. ■ SYSLOG SERVER n.n.n.n: The IP address of the syslog server used to receive and log syslog messages. ■ DEFAULT GATEWAY n.n.n.n: The IP address of the gateway or router used for communications with other networks. ■ IDLE TIMEOUT: The time period, in seconds, after which an idle TCP print data connection is closed (default is 270 seconds, 0 disables the timeout).
		DEFAULT IP	Specify the IP address to default to when the print server is unable to obtain an IP address from the network during a forced TCP/IP reconfiguration (for example, when manually configured to use BootP or DHCP). ■ AUTO IP: A link-local IP address 169.254.x.x will be set. ■ LEGACY: The address 192.0.0.192 will be set, consistent with older Jetdirect products.
		PRIMARY DNS	Specify the IP address (n.n.n.n) of a Primary DNS Server.
		SECONDARY DNS	Specify the IP address (n.n.n.n) of a Secondary Domain Name System (DNS) Server.
	IPV6 SETTINGS	**ENABLE**	Use this item to enable or disable IPv6 operation on the print server. ON: IPv6 will be enabled. OFF: IPv6 will be disabled.
		ADDRESS	Use this item to manually configure an IPv6 address. MANUAL SETTINGS: Use the MANUAL SETTINGS menu (see the additional options under IPV6

Table C-2 HP Jetdirect Graphical Control Panel Menu (continued)

Menu Item	Submenu Options	Additional Options	Description of settings
			SETTINGS) to enable and manually configure a TCP/IPv6 address. LINK-LOCAL: Use this item to display the IPv6 link-local address configured on the print server. DHCPV6: If available, use this item to display stateful IPv6 addresses controlled by a DHCPv6 server. ROUTER SPECIFIED: If available, use this item to display stateless addresses associated with a router.
		DHCPV6 POLICY	ROUTER SPECIFIED: (default) The stateful auto-configuration method to be used by the print server is determined by a router. The router specifies whether or not the print server is to obtain its address, its configuration information, or both from a DHCPv6 server. ROUTER UNAVAILABLE: If a router is not available, the print server should attempt to obtain its stateful configuration from a DHCPv6 server. ALWAYS: Whether or not a router is available, the print server will always attempt to obtain its stateful configuration from a DHCPv6 server.
		PRIMARY DNS	Use this item to specify an IPv6 address for a primary DNS server that the print server should use. Use the control panel navigation or keypad buttons to enter the address.
		SECONDARY DNS	Use this item to specify an IPv6 address for a secondary DNS server that the print server should use if the primary DNS server is not available. Use the control panel navigation or keypad buttons to enter the address.
		MANUAL SETTINGS	Use this item to manually set IPv6 addresses on the print server. ENABLE: Select this item and choose ON to enable manual configuration, or OFF to disable manual configuration. CHOOSE PREFIX: Use this item to select an IPv6 address prefix from a list of available prefixes configured on the print server. NEW PREFIX: Use this item to enter a 16 hexadecimal digit IPv6 address prefix using the colon hexadecimal syntax. Use the keypad or navigation buttons to specify each hexadecimal digit or separator (colon). Use the **Select** (or numerical keypad “6”) button to enter each digit or colon. Pressing the **Select** button after the last item saves the prefix. ADDRESS: Use this item to enter a 16 hexadecimal digit IPv6 node address using the colon hexadecimal syntax. Use the keypad or navigation buttons to specify each hexadecimal digit or separator (colon).

Table C-2 HP Jetdirect Graphical Control Panel Menu (continued)

Menu Item	Submenu Options	Additional Options	Description of settings
			Use the **Select** (or numerical keypad “6”) button to enter each digit or colon. Pressing the **Select** button after the last item saves the prefix.
	PROXY SERVER		(For printers/MFPs that support this feature) Specifies the proxy server to be used by embedded applications in your printer/MFP. A proxy server is typically used by network clients for Internet access. It caches Web pages, and provides a degree of Internet security, for those clients. To specify a proxy server, enter its IPv4 address or fully-qualified domain name. The name can be up to 255 octets. For some networks, you may need to contact your Independent Service Provider (ISP) for the proxy server address.
	PROXY PORT		(For printers/MFPs that support this feature) Enter the port number used by the proxy server for client support. The port number identifies the port reserved for proxy activity on your network, and can be a value from 0 to 65535.
IPX/SPX	**ENABLE**		ON: Enable the IPX/SPX protocol OFF: Disable the IPX/SPX protocol
	FRAME TYPE		Selects the frame type setting for your network. AUTO (default): Automatically sets and limits the frame type to the first one detected. EN_8023, EN_II, EN_8022, EN_SNAP: Frame type selections for Ethernet networks.
APPLETALK	**ENABLE**		(Ethernet/Fast Ethernet only) ON: Enable the AppleTalk protocol OFF: Disable the AppleTalk protocol
DLC/LLC	**ENABLE**		ON: Enable the DLC/LLC protocol OFF: Disable the DLC/LLC protocol
SECURITY	**PRINT SEC PAGE**		YES: Prints a page that contains the current security settings on the HP Jetdirect print server. NO: A security settings page is not printed.
	SECURE WEB		For configuration management, specify whether the embedded Web server will accept communications using HTTPS (Secure HTTP) only, or both HTTP and HTTPS.

Table C-2 HP Jetdirect Graphical Control Panel Menu (continued)

Menu Item	Submenu Options	Additional Options	Description of settings
			HTTPS REQUIRED: For secure, encrypted communications, only HTTPS access is accepted. The print server will appear as a secure site. HTTPS OPTIONAL: Access using either HTTP or HTTPS is permitted.
	IPSEC		Specify the operation of IPsec on the print server. KEEP: IPsec status will remain the same as currently configured. DISABLE: IPsec operation on the print server will be disabled.
	RESET SECURITY		Specify whether the current security settings on the print server will be saved or reset to factory defaults. NO (default): The current security settings are maintained. YES: Security settings are reset to factory defaults.
LINK SPEED	**AUTO** **10T HALF** **10T FULL** **100TX HALF** **100TX FULL** **100TX AUTO** **1000 FULL**		The link speed and communication mode of the print server must match the network. The available settings depend on the print server model. One of the following link configuration settings can be selected: **CAUTION** If you change the link setting, network communications with the print server and network device may be lost. **AUTO** (default): The print server uses auto-negotiation to configure itself with the highest link speed and communication mode allowed. If auto-negotiation fails, either 100TX HALF or 10TX HALF is set depending on the detected link speed of the hub/switch port. (A 1000T half-duplex selection is not supported.) **10T HALF**: 10 Mbps, half-duplex operation. **10T FULL**: 10 Mbps, Full-duplex operation. **100TX HALF**: 100 Mbps, half-duplex operation. **100TX FULL**: 100 Mbps, full-duplex operation. **100TX AUTO**: Limits auto-negotiation to a maximum link speed of 100 Mbps. **1000 FULL**: 1000 Mbps, full-duplex operation.
PRINT PROTOCOLS			Use this item to print a page containing the configuration of the following protocols: IPX/SPX, Novell NetWare, AppleTalk, DLC/LLC.

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